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Agency

Region 6
1201 Elm Street
Dallas, TX 75270

December 1978

Water

EPA

Environmental Impact Statement

Draft

COMPLETED

Wastewater Treatment Facilities
Terrebonne Parish, Louisiana

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DRAFT
ENVIRONMENTAL IMPACT STATEMENT

FOR

HOUMA-TERREBONNE
REGIONAL SEWERAGE FACILITIES

GRANT NO. C-220356-01

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 6
DALLAS, TEXAS
DECEMBER 1978

APPROVED BY:

Adlene Harrison

ADLENE HARRISON
REGIONAL ADMINISTRATOR

A

EXECUTIVE SUMMARY

(X) Draft Environmental Impact Statement

( ) Final Environmental Impact Statement

Environmental Protection Agency

Region VI

Dallas, Texas

1. Name of Action

Administrative (X)

Legislative ( )

2. Background

The U. S. Environmental Protection Agency is considering issuing a grant to design and construct a regional sewerage system in Terrebonne Parish, Louisiana under Section 201 of the Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977.

EPA issued a negative declaration, stating that the proposed project would have no significant environmental impacts and would not require an environmental impact statement (EIS). However, controversy developed during the review period concerning the project's potential impacts on wetlands, endangered species, and archaeological resources. As a result, in June, 1977, EPA issued a modified Negative Declaration and a simultaneous Notice of Intent to prepare an EIS. The parts of the project subject to the EIS are the system of force mains and holding basins, the gravity collection system, and expansion of the proposed treatment plants. These portions of the project are intended to serve the presently-unsewered population in the outlying areas of the parish.

3. Environmental Setting

Terrebonne Parish is located on the central Gulf Coast of Louisiana in what was once a Mississippi River delta formation. Approximately 86 percent of the parish's area is open water or wetland marsh. The average elevation of the parish is 5 ft above mean sea level, with the higher ground along the natural bayou ridges. Drainage is generally very slow, in a north-to-south direction. In the southern parts of the parish, winds and tide frequently override this pattern. The major flood threat to the parish is from hurricane tidal surges. A large number of local forced drainage projects are presently proposed or being implemented to reduce flooding of developed areas.

Over 45 percent of the parish is either wetland or forest. The marshes and estuaries support numerous shellfish, fish, and other wildlife. The parish has a large population of American alligators and contains three active Bald Eagle nests. Recreational use of the wetlands is very high. There are over 30 known archaeological sites in the parish, most of them located on the higher ground. A Level I Assessment and Field Survey of archaeological resources has been performed.

The parish population grew rapidly from 1950-1970, but has since slowed to an annual growth rate of 1.8 percent. The 1977 population was nearly 86,000, over two thirds of which reside in the area around the City of Houma and in the corridor northward to Thibodaux. The projected population for the 1995 design year is 118,117.

The area's economy is strong, with petroleum-related industries being the leading employers. Seafood, particularly shrimp, also plays an important role. The area's economy is expected to continue to expand for at least the next two decades.

4. Water Quality Problems

Terrebonne Parish has a significant surface-water quality problem, particularly south of the Gulf Intracoastal Waterway (GIWW). None of the existing private and public treatment facilities can consistently meet the required effluent limitations, and over 37,000 persons are not presently sewered. Much of the expected population increase will occur in the unsewered areas.

Pollution problems in the parish are compounded by the complex hydrology. Depending on tides and wind, flows can be in any direction, or nonexistent, thus preventing rapid dissipation of pollutants. Saltwater intrusion, caused primarily by the dredging of navigation canals and oil field access channels, is also a major problem.

High coliform bacteria concentrations resulting from raw and inadequately-treated sewage discharges and stormwater runoff also cause problems. About 40 percent of the parish's oyster grounds have been closed because of coliform contamination. The City of Houma's water supply is also affected.

5. Alternatives Evaluated by the Applicant

Alternate plans involved determining the optimum number and siting of treatment plants and selecting the treatment processes for a parish-wide system. Siting alternatives considered involved combinations of 2, 3, 4, 5, and 6 treatment plants at various locations. Process alternatives considered included land application, trickling filters, conventional activated sludge, physical-chemical systems, waste stabilization ponds with dissolved-air flotation, and activated bio-filters. Since the differences in the environmental effects of these

be extremely small. No known endangered or threatened species will be affected by the project. Mitigation measures will be incorporated to ensure that no archaeological resources will be adversely impacted.

The greatest direct long-term adverse impact of the project will be economic. At 1978 price levels, over $71 million of Federal funds and $33 million of local money will be required for the entire project.

The project will also cause secondary impacts, most of which are related to induced land use changes. A small amount of development will be induced by the project, mostly along higher ground adjacent to existing development. Because of parish land use controls, limited access, poor drainage, and flood hazards, very little of this induced development will occur in wetlands. No large tracts of vacant developable land will be served by the project, and much of any development induced will take place in existing areas, thus providing small increases in the efficiency of the distribution of public utilities and services. No major additions to any public utility distribution systems will be required. Property values in newly-sewered areas will increase, but this will be offset somewhat by the cost of the collection system.

8. Alternatives Available to EPA

EPA may: 1) deny the grant; 2) issue a grant for the project as proposed; or 3) issue a grant for an alternate project.

If EPA denies the grant, the parish would have to seek other ways to solve its water quality problems. These other solutions would be less efficient, and likely beyond the financial capabilities of the parish.

but about 18 miles of force mains will be in wetlands, as well as up to 7 of the holding basins.

7. Impacts of the Proposed Project

Short-term impacts of the proposed project will result from the extensive construction activities required. Dredging required for bayou and wetland crossings will destroy bottom organisms in the immediate construction zone and temporarily increase turbidity and siltation. Sewer line construction will destroy vegetation, and allow erosion, but the areas should revegetate within one or two growing seasons, except for the large trees. Disruptions to traffic and public safety hazards will be significant, since much of the construction will be along highway rights-of-way.

Long-term direct impacts of the proposed project will occur in many areas. The overall parish water quality will improve because of eliminating raw discharges from the presently-unsewered areas. Coliform bacteria pollution will be greatly reduced, perhaps allowing the re-opening of some oyster grounds, and lowering dangers to public health. Minor short-term adverse water quality impacts will occur periodically throughout the project's life as a result of localized discharges of pollutants due to force mains or holding basin levees breaking, pump failures, or hurricanes overtopping holding basins. About 30 acres will be permanently taken by the project, but only a small portion will be wetlands. Permanent adverse impacts on the biological environment will

options were almost negligible, project selection was based primarily on cost. The selected project consisted of two plants - an activated biofilter plant north of the GIWW, and a pond-DAF plant south of the GIWW.

6. Proposed Project

The portions of the proposed project subject to this EIS are:

a) Expanding the proposed North and South treatment plants by 4 and 3 mgd, respectively, to handle future growth in presently-unsewered areas.

b) Constructing 29 holding basins, two major pumping stations, and about 128 miles of major force main with diameters from 4 to 16 inches.

c) Constructing a gravity collection system, with 336 minor pump stations, 103 grinder pump stations, 156 miles of minor force mains, and 266 miles of gravity collection sewers.

d) Constructing a small package wastewater treatment plant at Isle de Jean Charles.

The project will collect sewage and transport it to a holding basin through the gravity sewers and minor force mains. Sewage will then be pumped to the next holding basin and on to a treatment plant through the major force mains. The holding basins will function as flow-equalization ponds so that the pumps can continuously pump the average flow, and not need to be sized for peak flows.

Nearly all of the gravity collection system is to be in public rights-of-way, and will serve existing development. The major force mains are also generally in public rights-of-way,

Should EPA issue a grant for the project as proposed, the impacts outlined above will occur. These impacts, overall, will be beneficial to the parish.

EPA may issue a grant for an alternative project. Such an alternative investigated was a project less than parish-wide in scope. It appeared that such a system could treat most of the wastewater, and yet eliminate the need for the proposed holding basins, major force-mains, and most of the gravity collection system, thus reducing the project's cost, its ability to induce development, and some overall impacts on wetlands. However, because of the remaining threats to public health within the parish, this alternative was not viable in consideration of the overall public interest.

9. Coordination of Draft EIS

Copies of this draft EIS have been made available to the following Federal, State and local interests for review and comment:

Advisory Council on Historic Preservation
US Department of Agriculture
US Department of Commerce
US Department of Housing and Urban Development
US Department of Health, Education and Welfare
US Department of Interior
US Department of Transportation
US Army Corps of Engineers
International Boundary and Water Commission
Federal Energy Administration
Federal Power Commission
Energy Research and Development Administration

Economic Development Agency
Environmental Protection Agency
State of Louisiana
Terrebonne Parish
City of Houma
Environmental and Conservation Associations
Organizations and Civil Groups
Businesses and Individuals
News Media

10. Public Hearing

A Public Hearing on the Draft EIS is scheduled to be held on January 23, 1979 at 7:00 p.m. in the Police Jury Meeting Room, Courthouse Annex, Houma, Louisiana.

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I. INTRODUCTION

1.1 LEGISLATIVE BACKGROUND

This environmental impact statement has been prepared in response to the mandates of the National Environmental Policy Act of 1969 (NEPA, or Public Law 91-190). NEPA requires that Federal Agencies prepare detailed environmental impact statements on major Federal actions significantly affecting the quality of the human environment. Section 511 of PL 92-500, the Federal Water Pollution Control Act of 1972 as amended, states that providing grant assistance to construct publicly-owned wastewater treatment facilities under Section 201 of the same act can constitute such a major Federal action.

1.2 PRESENT WATER QUALITY PROBLEMS

1.2.1 General Water Quality Problems

The Water Quality Management Planning for Louisiana, Detailed Work Plan report (the WQ Mgt. report, Reference 105) characterizes the area of Terrebonne Parish in the vicinity of Houma as one of the nine most severe municipal discharge water quality problems in the state. Segment 12G of the Terrebonne hydrologic basin, south of Houma, has been classified as a Water Quality Limited segment in the Water Quality Management Plan, Terrebonne Basin (The Basin Plan, Reference 104). This classification requires that all municipal discharges meet effluent limitations much stricter than the secondary treatment standards required in Effluent Limited segments. The Terrebonne hydrologic basin and Terrebonne Parish are shown on Figure 1, and the various segments of the basin are shown on Figure 2.

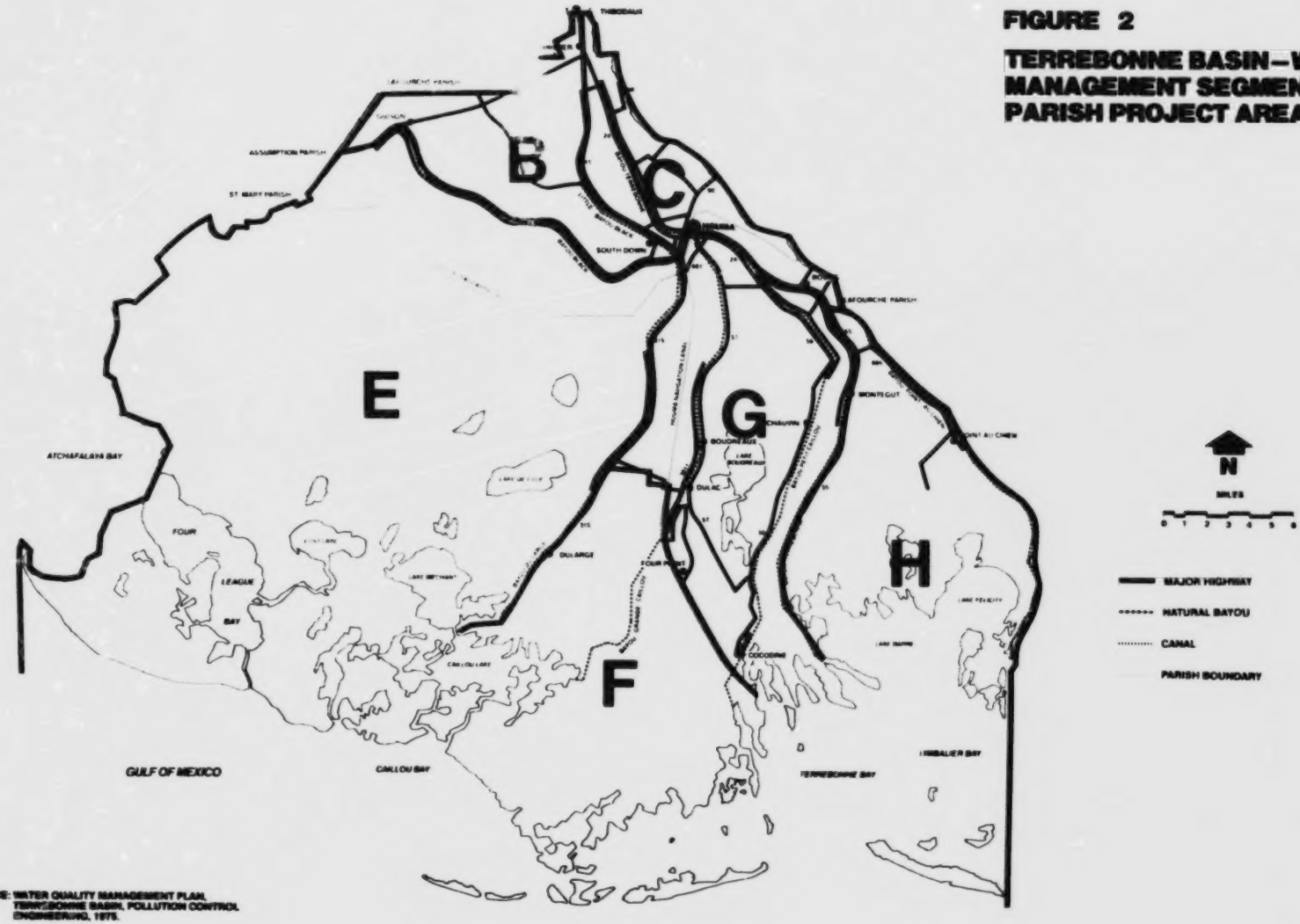
The particular conditions comprising the water quality problem in Terrebonne Parish include high concentrations of total dissolved solids (TDS) and chlorides throughout the

...E WATER QUALITY MANAGEMENT
PLAN TERREBONNE BASIN
POLLUTION CONTROL ENGINEERING
INC.

FIGURE 1
LOCATION MAP TERREBONNE BASIN (BASIN NO. 12)

FIGURE 2

TERREBONNE BASIN – WATER QUALITY MANAGEMENT SEGMENTS IN TERREBONNE PARISH PROJECT AREA



SOURCE: WATER QUALITY MANAGEMENT PLAN, TERREBONNE BASIN, POLLUTION CONTROL ENGINEERING, 1975.

area, dissolved oxygen (DO) concentrations below minimum standards, and very high coliform concentrations. DO levels are particularly critical in Bayou Terrebonne and the Gulf Intracoastal Waterway (GIWW), where summer readings of zero DO for several weeks are not uncommon. Various other bayous often exhibit concentrations as low as 1 or 2 milligrams per liter (mg/l) (min. stds.: tidal areas - 4 mg/l; 5 mg/l elsewhere). High coliform concentrations (in excess of 1600 per 100 ml) have frequently been recorded throughout the project area, particularly in Bayou Black Reservoir, the GIWW, Bayous Black, du Large, and Grand Caillou, and the Houma Navigation Canal.

1.2.2 Factors Causing Water Quality Problems

Several factors contribute to the water quality problems in the parish. The only one which the proposed project directly addresses is the large number of discharges of untreated and inadequately-treated sewage throughout the parish. Some 37,200 persons, almost half of the parish population, are not connected to any sewer system, and either use septic tanks or discharge directly to area watercourses. The degree of treatment generally achieved by septic tanks is very low because of the saturated soil conditions in much of the parish. These conditions can frequently lead to raw sewage standing in marshes and other surface waters, creating public health hazards. Additionally, none of the seven publicly-owned treatment facilities and very few, if any, of the 66 privately-owned treatment facilities in the parish are able to consistently meet the effluent limitations now being required, and the City of Houma's sewer system has many bypasses and overflows that frequently discharge raw sewage to nearby watercourses.

These pollution problems will be compounded by the rapid population growth projected to continue through the

20-year design life of the project. The presently-sewered areas of the parish are rapidly approaching saturation density, and thus a great portion of the expected growth will take place in the unsewered areas, possibly doubling the unsewered population by 1995.

Another major factor contributing to the water quality problems in the project area is the unique hydrology of southern Louisiana. Surface-water flows are predominantly influenced by wind and lunar tides, changing directon with changes in the tides and winds. Because of the varying directions of flow through the complex interconnected system of bayous, marshes, lakes, and bays, discharges to surface waters tend to become spread over very wide areas rather than flowing downstream to the Gulf. If the bayous had distinct, unreversed currents, much of the present pollution would be confined to narrow stream widths, carried away quickly, and reduced to an inoffensive state by the natural regeneration processes of flowing streams. However, since the actual situation includes frequent, prolonged, no-flow periods, discharges tend to become the receiving stream through the mechanism of displacement, and the pollutants are slowly dispersed in all directions, degrading water quality over wide areas.

Perhaps the most significant water quality problem in Terrebonne Parish, especially in terms of potential damage to wetlands, is saltwater intrusion. Measurements of TDS and chloride concentrations taken throughout the project area indicate that this problem is steadily growing worse. The numerous navigation waterways and oil well access canals dredged in recent years are considered a prime cause of saltwater intrusion in the area.

Other factors contributing to the parish water quality problems can generally be grouped as pollution from non-point sources. These include urban runoff, agricultural runoff (principally from sugarcane fields), and natural sources. The principal natural source problem is the frequent resuspension by wind and tide changes of large quantities of high oxygen-demand bottom deposits which consume much of the available DO. The Basin Plan cites discharges originating in Segment G, which includes the built-up area around Houma and the seafood packers south of the City, as the primary causes of coliform count violations throughout the entire basin. The untreated discharges from the seafood packing plants south of Houma, the numerous bypasses and overflows from Houma's sewer system, and the untreated, partially-treated, or unchlorinated discharges from unsewered residences and inadequate public and private treatment plants also add to the low DO concentration.

1.2.3 Impacts of Water Quality Problems

Three specific impacts arise from the general water quality problems discussed above. These are: 1) contamination of oyster beds; 2) potential contamination of drinking water supplies; and 3) wetlands degradation.

1.2.3.1 Oyster Bed Contamination. Oysters abound in the southern parts of the parish, particularly around Lakes Boudreaux, Mechant, and Caillou, and oyster harvesting is a significant part of the parish's economy. Oysters, however, can concentrate waterborne pollutants in their tissues, making them unfit for human consumption. The State Division of Health regulates the sale of oysters based on the concentrations of four parameters: coliform bacteria; heavy metals; radioactivity; and ciguatera toxin. To date, about 40 percent of the oyster beds in the parish have been closed because of high coliform bacteria concentrations.

1.2.3.2 Drinking Water Supply Contamination. The City of Houma and Terrebonne Parish each operate water treatment plants and distribution systems. The distribution systems are interconnected, so that each jurisdiction serves as backup for the other. The parish system receives raw water from the Mississippi River via Bayou Lafourche by contract with the Lafourche Fresh Water District (Reference 18). This water is of good quality, and is amenable to inexpensive treatment. On the other hand, the City of Houma draws its raw water from either the GIWW (the primary source) or Bayou Black Reservoir, and neither of these sources provides consistently high quality water.

Raw water from the GIWW frequently contains zero dissolved oxygen and high coliform concentrations, and is also subject to saltwater intrusion. While the first two problems are relatively easily overcome during treatment, albeit at increased expense, saltwater intrusion reduces the water's quality to a point unfit for use. Although the State Division of Health recommends a maximum salinity of 250 mg/l for raw water supplies, salinity above 7,500 mg/l has been measured in the GIWW. When the GIWW cannot be used (about 3-5 months each year), the City draws water from the Bayou Black Reservoir.

The Bayou Black reservoir has its drawbacks as a raw water supply, also. City and Parish residents can tell whenever the switch is made to Bayou Black water by the appearance of objectionable taste, odors, and color. In addition, the Basin Plan states that "... coliform samples have been taken in Bayou Black Reservoir. They show total coliform counts ranging from 35,000 per 100 ml to 92,000 per 100 ml. This is important because it indicates a water quality problem in Houma's water supply."

Although there have been no reported outbreaks of water-borne disease in Terrebonne Parish, the continued discharge of raw sewage into the parish waters cannot help but increase the threat to public health. The most important communicable water-borne diseases are typhoid fever, paratyphoid fever, dysentery, gastroenteritis, infectious hepatitis, and cholera. These diseases can be transmitted from the intestinal and urinary discharges of sick persons and carriers into surface water supplies if adequate treatment is not provided.

1.2.3.3 Degradation of Wetlands. Wetlands are a significant national natural resource. They provide habitat for shellfish, waterfowl, and a vast array of other wildlife, thus supporting a significant amount of commercial and recreational activity. Wetlands also serve important hydrologic and geologic functions, such as retention of floodwaters, recharge of groundwaters, etc. In recognition of these values, the protection of wetlands has become a national priority, as set out in Executive Order Number 11990.

There is considerable potential for wetlands degradation in Terrebonne Parish caused by the numerous discharges of untreated and inadequately treated domestic and industrial sewage. The Basin Plan emphasizes that the numerous existing discharges, coupled with the area's hydrology and the parish's anticipated growth, have "a potential of heavily impacting the delicate marsh ecosystem." The principal threat to wetland areas caused by a lack of sewage treatment is the over-enrichment of waters from nutrients in the raw sewage. This over-enrichment eventually results in a depletion of the dissolved oxygen and a die-off of the vegetation, accelerating the process of eutrophication, and adversely affecting aquatic life. Other threats

include deprivation of sunlight by increased turbidity, and siltation resulting from an excess of solids discharges.

1.3 PROJECT BACKGROUND

In response to these water quality problems, Terrebonne Parish undertook a comprehensive area-wide sewerage improvements study, which was completed in October, 1971. Enactment of PL 92-500 brought about substantial changes in sewage treatment requirements and construction grant program procedures which rendered the 1971 Plan inadequate and required the preparation of a new facility plan. In July, 1974, an EPA Step I grant was awarded to the Terrebonne Parish Police Jury for the preparation of that new facility plan, which was completed in April, 1976.

EPA issued a negative declaration, stating the proposed project would have no significant environmental impacts and would not require an environmental impact statement (EIS). Questions raised by conservation groups in response to the Negative Declaration prompted EPA to reevaluate its decision and modify the scope of the initial Negative Declaration. This modified Negative Declaration, issued on June 20, 1977, included only rehabilitation and new sewer construction in the presently developed areas in and immediately adjacent to Houma, and limited expansion of the North and South treatment plants. At the same time, EPA issued a Notice of Intent to prepare an EIS on the remaining portions of the project. The items to be covered by the EIS include: 1) the system of holding basins, major force mains, and major pumping stations intended to collect, store, and transport sewage from the various unsewered service areas of the parish (the Holding Basin System); 2) the system of gravity sewers, minor force mains, and minor pumping stations intended to collect sewage

from individual contributors and deliver it to the various holding basins (the Gravity System); and, 3) the 7 mgd total expansion to the presently designed capacities of the two proposed treatment plants to allow them to serve the anticipated growth of the presently-unsewered areas. The modified negative declaration and the Notice of Intent are presented as Items 1 and 2, and the initial negative declaration as Item 4, in Appendix A.

The major concern of the conservation groups who commented on the negative declaration was the potential effect of the proposed project on the parish wetlands. Particular areas of this concern included:

a. the secondary impacts of development in wetland areas induced by the proposed project.

b. the direct impacts of the project on ecological communities, rare and endangered species, and archaeological resources.

c. the cumulative effects of the proposed project in relationship with the other projects planned in Terrebonne Parish.

d. the development of measures to mitigate potential adverse impacts.

The letters of comment expressing these concerns by the conservation groups are included as Items 5, 6, and 7 in Appendix A.

2. ENVIRONMENTAL SETTING

2.1 GEOLOGY

Terrebonne Parish lies within the Mississippi Deltaic Plain and is a region of very low relief with much marsh and wetland. The area has been influenced by fluvial and marine geologic processes since Cretaceous time. Deltaic sedimentation has been the most important, filling the subsiding basin to a present depth of over 40,000 ft.

2.1.1 Topography

Once the delta plain was established, overbank flooding and subsequent sediment formed the natural levee ridges that characterize the area. These ridges border active and abandoned courses and distributaries of the Mississippi River, and are generally oriented in a north-south direction. The natural levees bordering tidal channels and larger streams reach a maximum elevation of about 14 ft msl, and average about 5 ft msl throughout the parish. The levees are several thousand feet wide in the northern part of the parish, and decrease in both width and height to the south until they disappear beneath the marsh. Between the bayous, the natural levee ridges gradually slope downward into swamp and marsh basins at or near sea level. Marshes and wooded swamplands are found in the interior basins.

2.1.2 Soils

The parish soils consist of alluvial soils along the natural levee ridges, marine silts and clays, and wetland marsh soils. The natural levee ridges consist of silts, silty sands, and silty clays, and are thickest at the bayou edge, but thin rapidly and become finer as the ridges merge with the inter-bayou basin soft clays, sand, and organic marsh deposits.

The marshes generally have a superficial layer of muck with extremely high organic and moisture contents. These layers may be as much as 20 ft thick.

The parish's soils are combined into four associations by the U.S. Soil Conversation Service, and are located as shown in Figure 3. The description of these associations follows.

a. Mhoon - Commerce Association

These soils are silt loam, silty clay loam, or silty clay occupying most of the narrow ridges of the natural levees. These level or nearly-level soils have been farmed for about 100 years and are considered to be imperfectly drained. The Commerce soils, being higher on the ridges than Mhoon soils, are moderately well drained.

b. Sharkey - Swamp Association

This association consists of slack-water clays that are dark-colored and poorly drained. These soils are located on the lower borders of the natural levee ridges and in the adjoining swamps. Artificial drainage is required to work these soils.

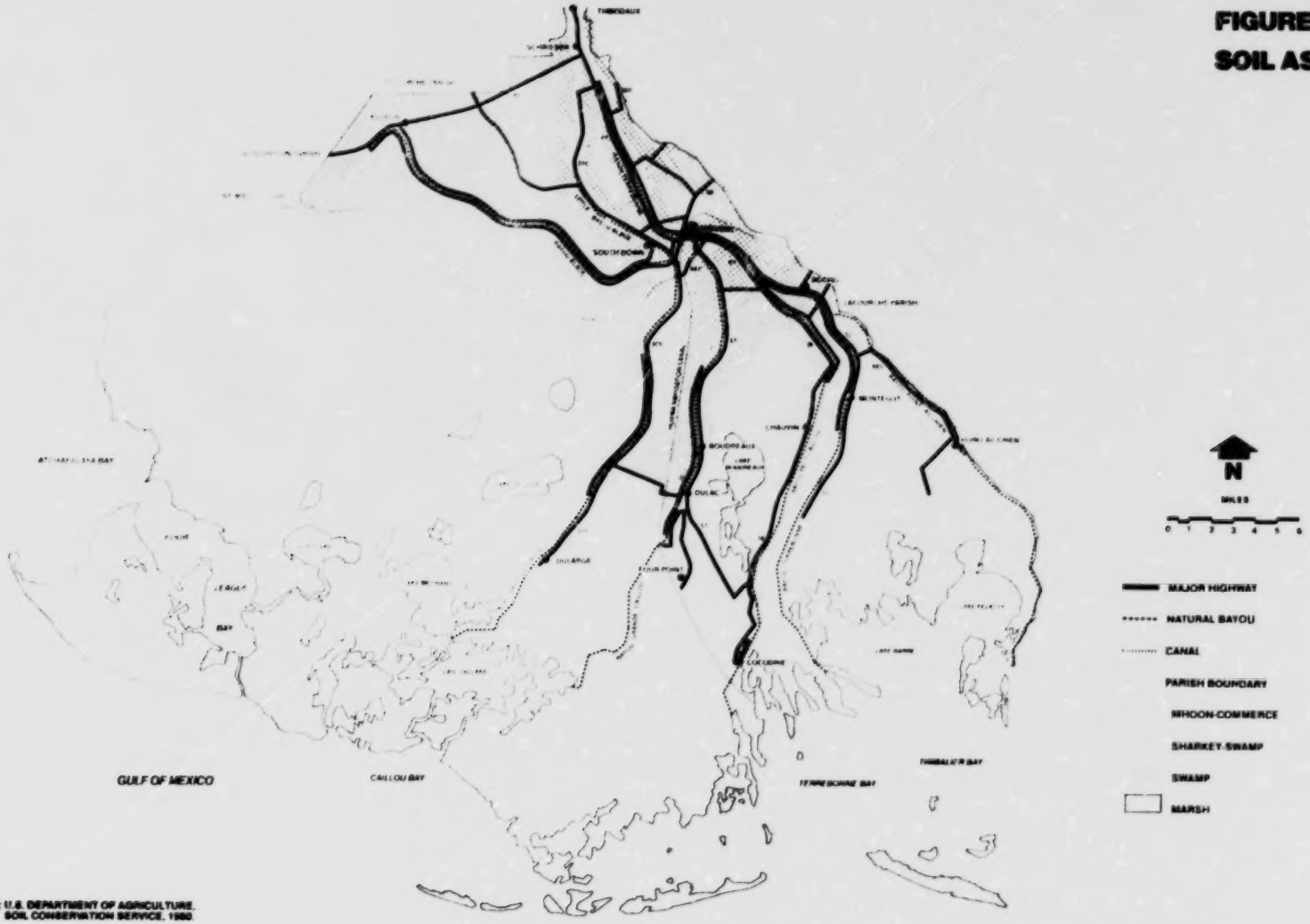
c. Swamp Association

These soft soils are divided between clays and mucky clays, and peats and muck. The swamps occupy the area between the coastal marshes and the Sharkey-Swamp Association bordering the natural levees. The usually wet, forested soils of the swamps are frequently flooded to depths ranging from a few inches to a few feet.

d. Marsh Association

These frequently-flooded soils cover most of the parish land area. They generally have a 2- to 5-ft peat-and-muck layer overlying alluvial clays and silty clays. They are

FIGURE 3
SOIL ASSOCIATION MAP



SOURCE: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, 1980.

found in the broad plain that is nearly level with the Gulf, and which is flooded from the shore side with fresh water and from the Gulf side with salt water, leaving a broad east-west band of brackish peat and muck soils in between.

2.1.3 Subsidence

There are two types of subsidence processes active in Terrebonne Parish. The first of these is a general parish-wide subsidence resulting from consolidation and load compaction of the accumulated deltaic sediments. The subsidence rates vary from 0.4 to 0.7 ft per century across the parish, with the lowest rates occurring in the extreme southern areas. The rate averages 0.6 to 0.7 ft per century over nearly all of the project area, as shown in Figure 4. This process is a steady, region-wide phenomenon and therefore poses little threat to project facilities.

In addition to the parish-wide phenomenon of compaction subsidence, relatively severe local subsidence can occur as a result of draining and/or imposing heavy loads on the soils, particularly where the soil subsidence potential varies significantly within a short distance as, for example, along the southern reaches of Bayous Terrebonne and Petit Caillou. The potential of various soils to subside when drained is also shown on Figure 4.

2.1.4 Economic Geology

The parish has the second highest value of mineral production in Louisiana. In 1972, it accounted for 16 percent of the state's total value of mineral production. In order of value, the parish produces petroleum, natural gas, natural gas liquids, sulfur, and salt.

More than 15 percent of Terrebonne Parish is estimated to be underlain by oil and gas fields, and most wells

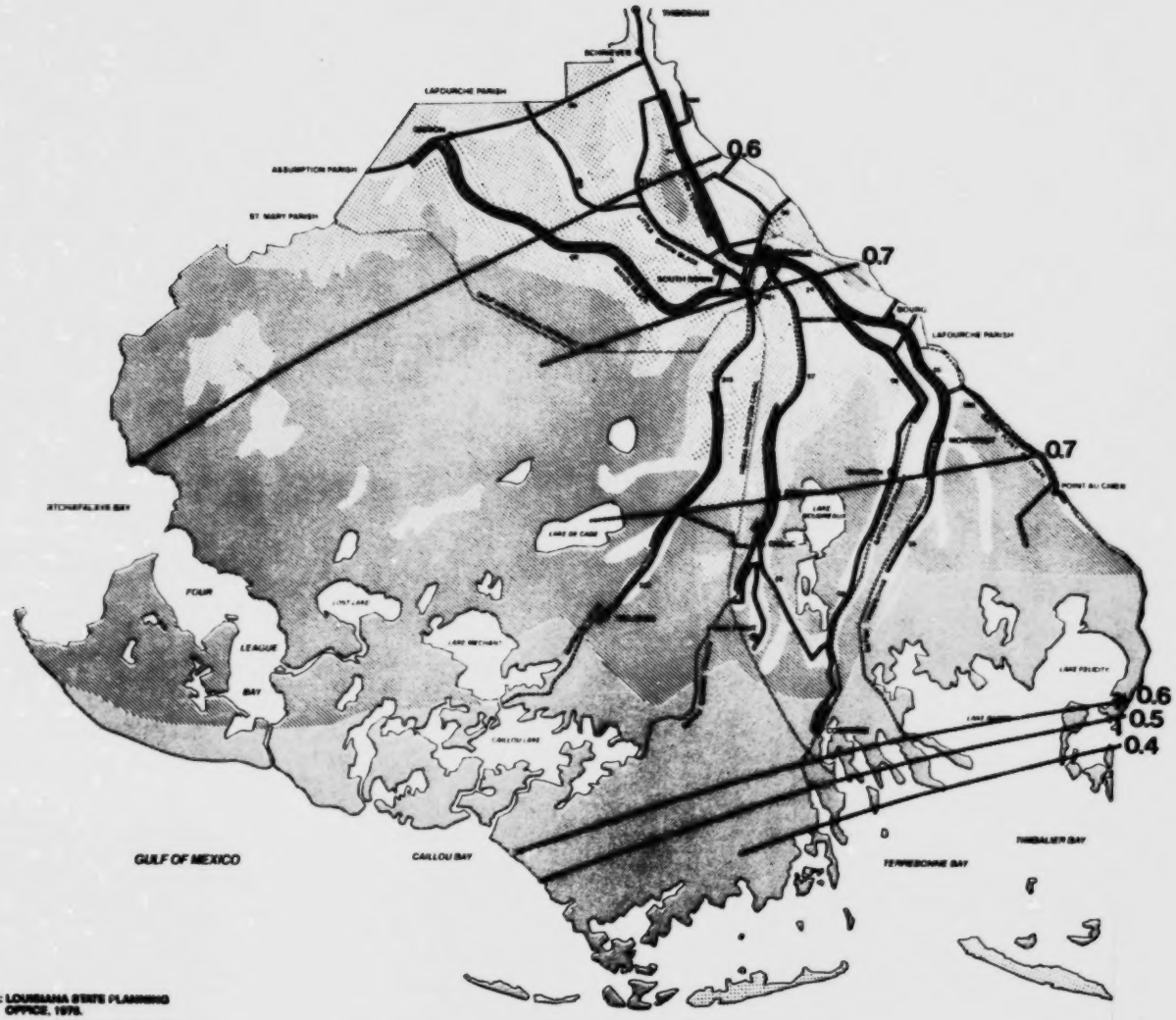


FIGURE 4

SOIL SUBSIDENCE POTENTIAL AND SUBSIDENCE RATES

SOURCE: LOUISIANA STATE PLANNING OFFICE, 1978.

SOURCE: COASTAL ENVIRONMENTS, 1974.

are located in the swamp and marshland areas. Table 1 presents recent petroleum and natural gas production totals. With existing technology, the southern Louisiana fields are estimated to have sufficient known inland and off-shore reserves to sustain at least 20 to 25 years of additional production at recent extraction rates (reference 93). The parish is also underlain by extremely large deposits of methane gas, which could become increasingly valuable in the future.

2.2 HYDROLOGY

2.2.1 Climate

The parish has a humid, subtropical climate which is determined principally by its southern latitude and proximity to the Gulf of Mexico. Temperatures range from a January mean minimum of 45°F to a July mean maximum of 92°F. Precipitation averages 60 to 66 inches annually across the parish. Seasonal rainfall is heaviest during the summer months, and is somewhat less in winter. Fall is the driest season.

Tropical cyclones are a common occurrence in southern Louisiana, averaging about one per year. They occasionally reach hurricane intensity, accompanied by high tides and torrential rains. Hurricane frequency for the area is 41 per 100 years (1900-1956 records, U.S. Department of Commerce, 1974).

2.2.2 Groundwater

Suitable groundwater supplies in the parish are very limited, primarily because of saltwater intrusion. Suitable groundwater, which is defined by the U.S. Public Health Service as that having a chloride content of less than 250 ppm, can only be found roughly north of an east-west line through Houma. (see Figure 5). The supply of fresh groundwater is

TABLE 1

OIL AND GAS PRODUCTION
TERREBONNE PARISH, LOUISIANA
1968 TO 1974

Year	Crude Oil (Barrels)	Condensate (Barrels)	Casinghead Gas (M.C.F.)	Natural Gas (M.C.F.)
1968	88,181,895	17,492,123	188,639,388	702,209,426
1969	92,661,192	22,774,969	201,596,164	944,523,419
1970	104,917,808	24,023,022	223,067,852	1,152,417,995
1971	69,222,711	18,672,523	156,020,376	912,615,559
1972	55,923,675	15,970,879	161,321,904	853,697,171
1973	47,064,255	15,022,143	139,822,636	814,446,849
1974	34,739,965	12,577,051	97,593,801	723,812,065

SOURCE: Louisiana Department of Conservation

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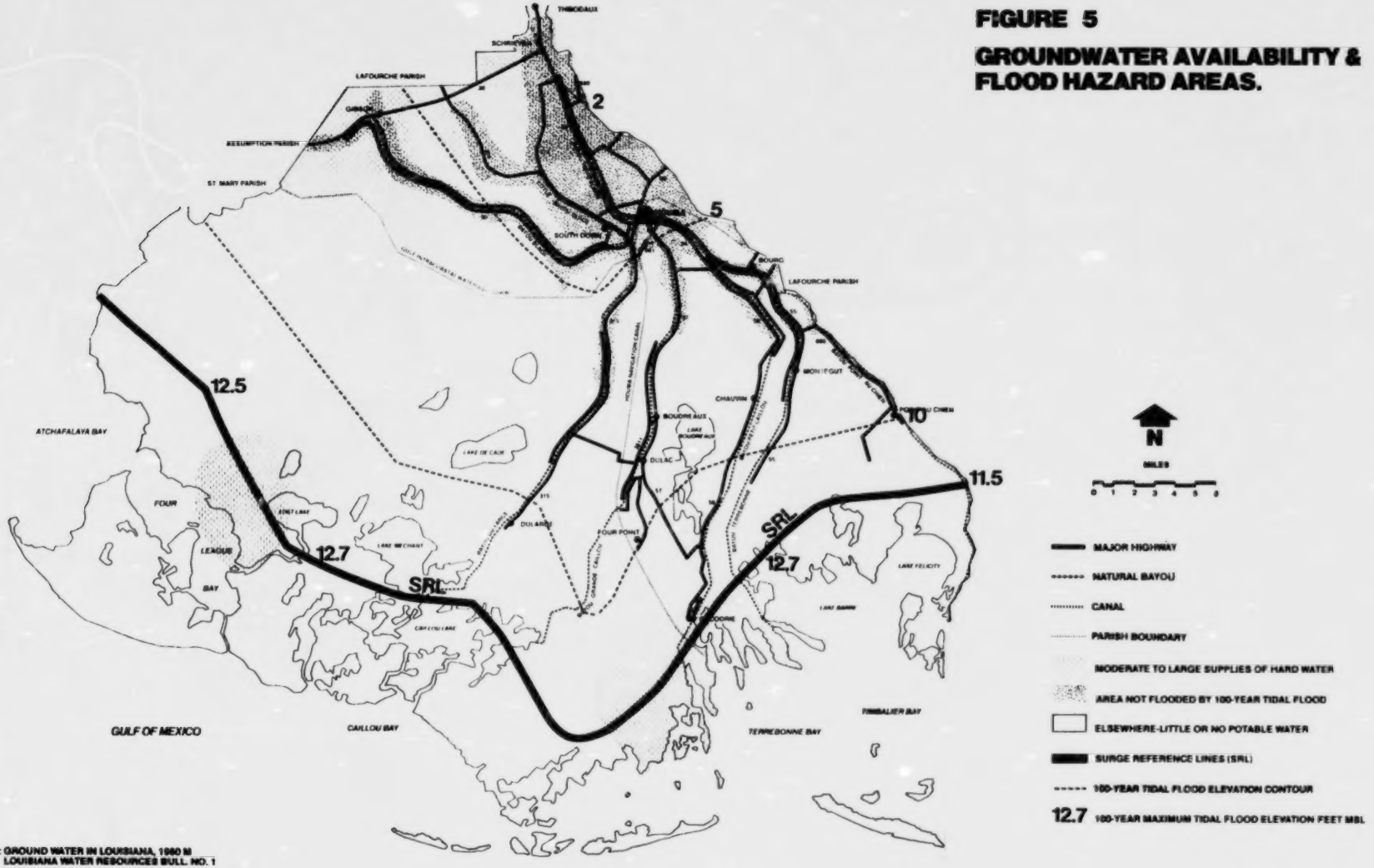
FIGURE 5

GROUNDWATER AVAILABILITY & FLOOD HAZARD AREAS.



SOURCE: GROUND WATER IN LOUISIANA, 1980 M
LOUISIANA WATER RESOURCES BULL. NO. 1
TYPE 5 FLOOD INSURANCE STUDY, NEW ORLEANS
DISTRICT, CORPS OF ENGINEERS, 1970.

generally restricted to subsurface sand deposits in ancestral channels of the Mississippi River.

Saltwater intrusion results from the many direct connections to the Gulf of Mexico provided by the bayous, navigation canals, and petroleum industry canal systems. In these areas, the groundwater becomes more saline with depth because of the weight differential between fresh and saltwater. Therefore, wells must be screened at a shallow depth and pumped at a low rate to prevent the incursion of saltwater.

2.2.3 Surface Waters

The surface waters in the parish consist of lakes, marshes, swamps, bayous, navigation and petroleum industry canals, and sounds and bays of the Gulf of Mexico. Over 600,000 acres, or almost 42 percent of the parish, is open water. The parish lies within the Terrebonne basin, a hydraulically distinct management unit covering about 1,750 square miles.

Drainage is by gravity from the levee ridges to the interior marshes, and then generally southward through various bayous toward the Gulf. Drainage patterns are non-existent near the Gulf, where tidal effects are dominant.

Potable water supplies for the City of Houma and the three Terrebonne Parish Waterworks Districts are taken from surface waters (see Section 1.2.3.2).

Barges are used to transport industrial materials on the navigation canals, and heavy commercial fishing traffic is carried on the larger bayous such as Terrebonne and Grand Caillou. The parish waterways are also used extensively for recreational boating, fishing, and access to waterfowl hunting areas.

2.2.4 Flooding Potential

The major flood threat to Terrebonne Parish is from tidal surges caused by hurricanes. A Type-5 Flood Insurance Study for the Louisiana Gulf Coast, including Terrebonne Parish, has identified areas that will be inundated by the 100-year tidal flood. These areas are shown in Figure 5. (The 100-year flood is a flood of such magnitude that it has a one-percent chance of occurring in any given year.)

The depth of flooding is determined by the land elevation, the distance from the coast, and the velocity and duration of the wind. Elevation-frequency curves for hurricane surges are shown in Figure 6. These elevations are given at the surge reference line (SRL), a synthetic coastline where the maximum surge-heights will occur. Hurricane surge-heights at points inland decrease proportionally with distance from the SRL at the rate of 1 ft per 2.75 miles. The SRL and inland surge-height contours are also shown in Figure 5.

Local flooding caused by slow run-off of heavy rains can also occur. Forced-drainage projects to prevent such flooding have been either constructed or proposed for many of the parish's developed areas. The forced-drainage project areas are shown in Figure 7.

2.3 AIR AND SOUND QUALITY

There are presently no air quality problems in Terrebonne Parish. There are no major industrial polluters, and automotive pollution is negligible. There are no topographic or regular climatological factors which could compound air quality problems.

There are no major reported odor problems in the parish. Local problems do occur occasionally at seafood processing plants.

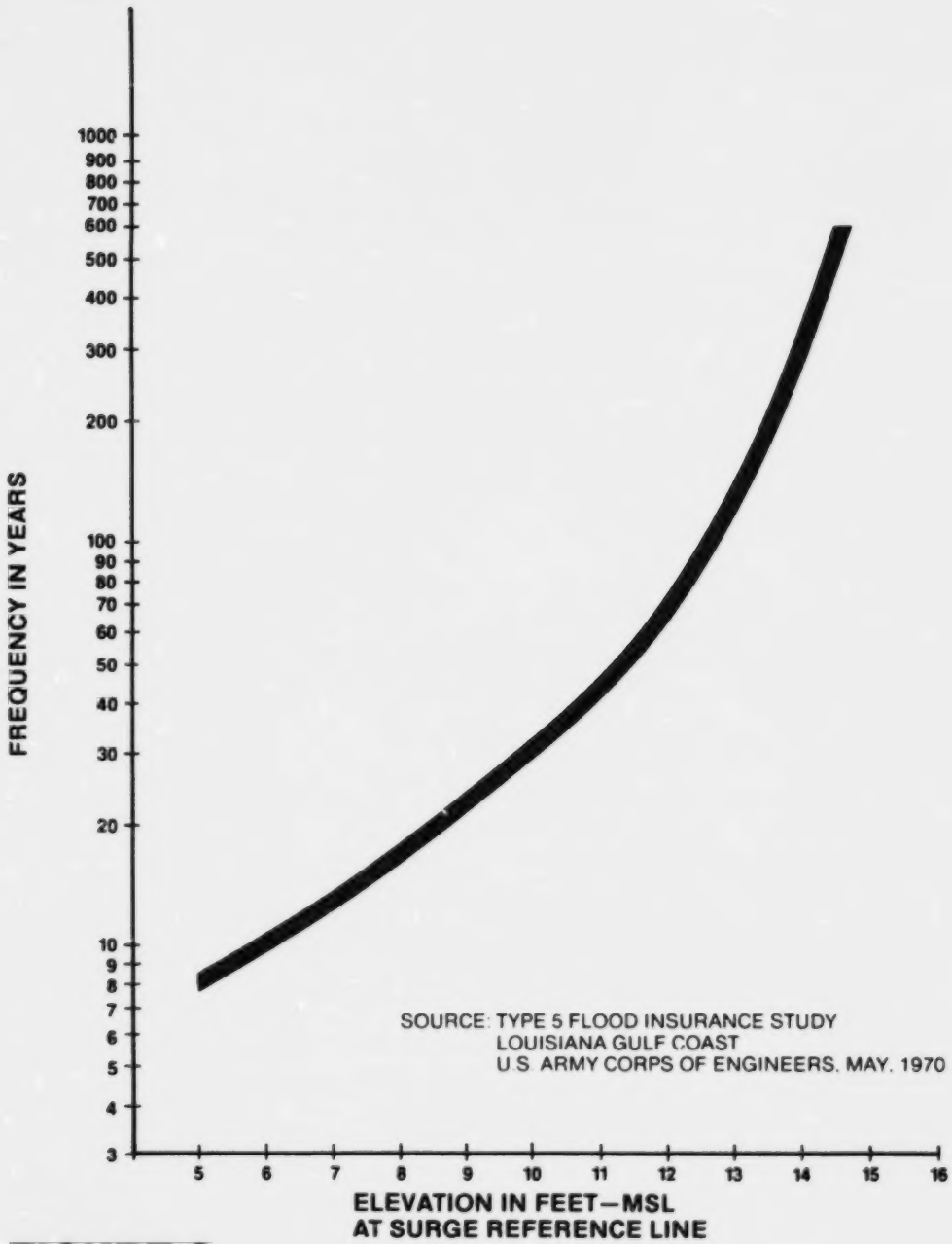
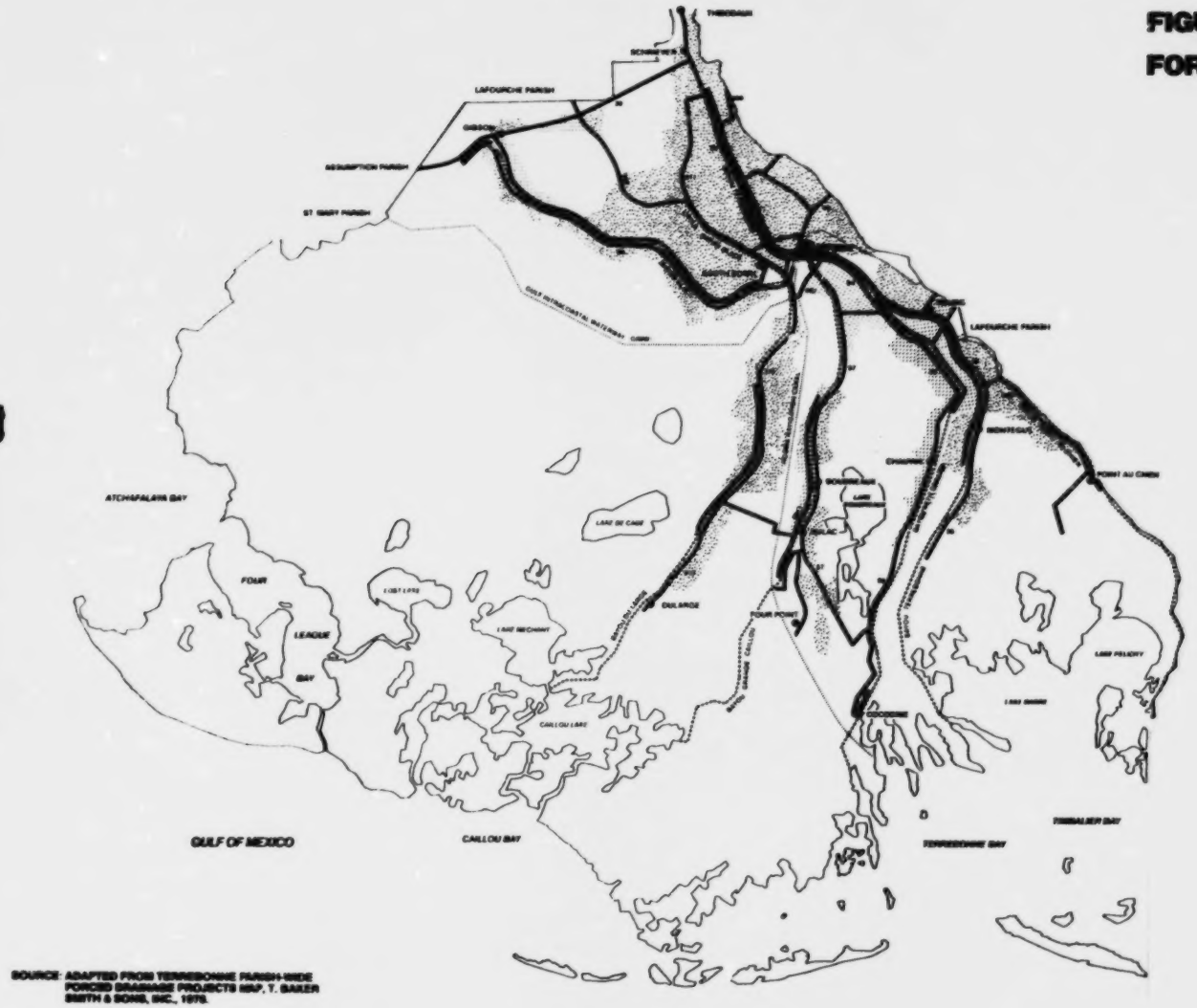


FIGURE 6
HURRICANE SURGE
ELEVATION– FREQUENCY CURVES

FIGURE 7
FORCED DRAINAGE PROJECT AREAS



SOURCE: ADAPTED FROM TERREBONNE PARISH-WIDE FORCED DRAINAGE PROJECTS MAP, T. BAKER SMITH & SONS, INC., 1979.

The parish has no unusual noise problems at the present time.

2.4 BIOLOGICAL SETTING

This section describes the composition and ecological relationships of the major groups of plants and animals in Terrebonne Parish.

2.4.1 Botanical Elements

2.4.1.1 Introduction. Most of the project construction will occur along high ground in the northern reaches of the parish and along the natural levee ridges paralleling the major distributaries that drain the area. These ridges support mainly non-wetland vegetation that grades into wetland types away from the bayous.

The plant communities can usually be related to physiographic features, drainage patterns, and human encroachment. These communities include bottomland hardwoods, cypress-tupelogum swamps, marshes (grading from fresh to saline in a north-to-south direction), agricultural crops, and cultivated landscape plants occurring in residential areas.

Vegetation on the ridges, in the swamps, and in the marshes directly or indirectly provides habitat, shelter, and food for hundreds of species, notable of which are fur-bearing animals, alligators, waterfowl, deer, rabbits, squirrels, and doves. Shrimp, crabs, oysters, and menhaden thrive in coastal waters enriched by detritus run-off from land areas. As noted by Day, et al (Reference 23), conditions for developing the greatest possible overall estuarine productivity appear to be present in the Mississippi Delta region, of which Terrebonne Parish is a large part.

2.4.1.2 Bottomland Hardwoods and Cypress - Tupelogum Swamps. Approximately 111,000 acres or about 7.5 percent of Terrebonne Parish is in bottomland hardwoods and cypress-tupelogum swamps, 90,000 acres of which are classified as forested wetland (Louisiana State Planning Office, 1975). These two vegetative communities are well-known, and usually occur adjacent to one another, with intergradation along the contact. The hardwoods occupy the higher and better-drained soils of the natural levees.

2.4.1.3 Marshes. The Louisiana Coastal Marshes have been subdivided by Chabreck (Reference 11) into four vegetative types (determined primarily on salinity). The vegetative-type categories - saline, brackish, intermediate, and fresh - generally parallel the coast in an east-west direction. The plant species designated as characteristic of those marsh areas are listed in Chabreck (Reference 11). Phytoplankton to be expected in these areas are listed in Whitehurst (Reference 107). The variety of species found decreases to the south as the marshes grade from fresh to saline. Approximately 539,000 acres, or 38 percent, of Terrebonne Parish (Louisiana State Planning Office, 1975) is marsh. The extent of the four marsh types is shown in Figure 8.

a. Fresh marshes. Fresh marshes are the most northerly-extending of the marsh types, and are located mostly south of the Intracoastal Waterway. They have an average salinity of 1 ppt and a salinity range of .09-4.54 ppt (Chabreck, Reference 11).

b. Intermediate marshes. The intermediate marshes form a continuous narrow zone (1 to 2.5 miles wide) extending across the parish between the fresh and brackish marshes. The

FIGURE 8
MARSH TYPES

SOURCE: ADAPTED FROM VEGETATIVE TYPE MAP OF THE LOUISIANA COASTAL MARSHES, LOUISIANA WILDLIFE AND FISHERIES COMMISSION, 1956.

water salinity averages 4.68 ppt, and ranges from 0.34-9.80 ppt (Chabreck, Reference 11).

c. Brackish marshes. Salinity in the brackish marshes is apparently much influenced by tides, as indicated by the wide salinity range. The average salinity is 7.6 ppt, with a range from 2.42-18.50 ppt (Chabreck, Reference 11).

d. Saline marshes. Saline marshes occupy the coast of Terrebonne Parish, and extend more than ten miles inland in some places. Tidal fluctuations cause frequent flooding and draining, and variable high salinity levels. This marsh type has the least plant diversity of the marshes. The average salinity is 17.37 ppt, and the range is from 8.07-32.39 ppt.

2.4.1.4 Croplands and Pasture. According to the Louisiana State Planning Office (1975), 55,000 acres, or 4 percent, of the total acreage in the parish is used for agriculture. The three major crops are sugarcane (the most important), corn, and soybeans. These crops, as well as truck crops, are planted on the narrow levee ridges and on some force-drained land. Production of beef cattle is of some importance and is apparently slowly increasing.

2.4.1.5 Rare and/or Endangered Species. There are no known rare and/or endangered plant species in Terrebonne Parish, nor are there any noted unique or unusual plant communities.

2.4.2 Invertebrates

2.4.2.1 General. Freshwater marshes and swamps are extensive in Terrebonne Parish, and support diverse and abundant invertebrate communities. The brackish marshes likewise support phenomenally large populations of invertebrates extremely important to the ecologic community structure and trophic chains. Although crayfish are extremely important in South

Louisiana, and are abundant in the parish's fresh waters, they are not as extensively cultivated as they are in adjacent areas. Only 40 acres are devoted to commercial production, and this acreage is not in the area of concern.

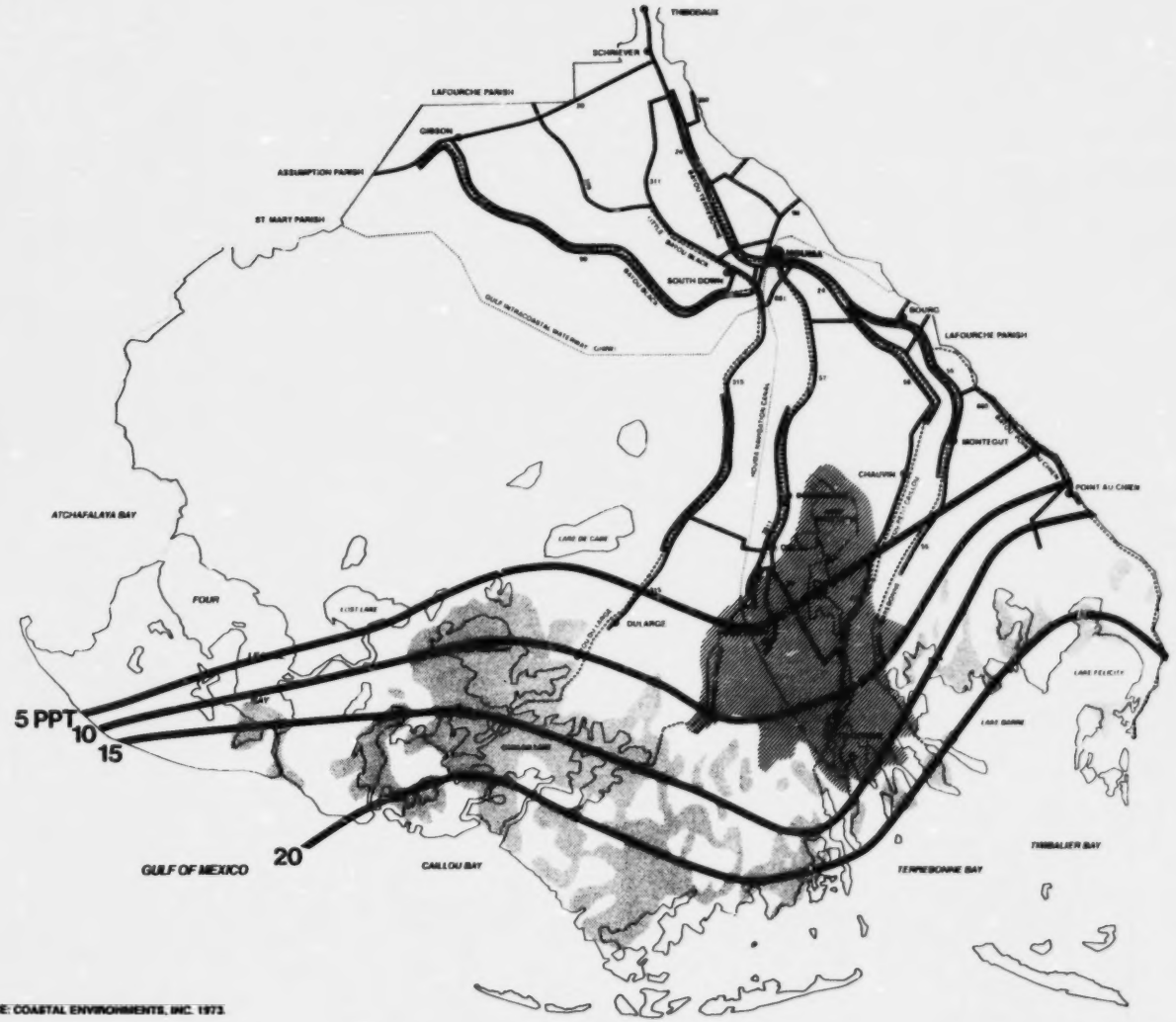
2.4.2.2 Oysters. The American oyster (Crassostrea virginica) is economically quite important to coastal Louisiana in general and to Terrebonne Parish in particular. Oysters rank third in dollar value of fishery landings in Louisiana, and the Terrebonne Basin ranks third in oyster production among coastal Louisiana drainage units (Van Sickle, Reference 108). In terms of nutritional value and the relative energy cost of their production and harvest, oysters are superior to shrimp. Although oysters represent only a minor fraction of the parish's total economy, they are discussed in detail because they offer an excellent example of man's effects (particularly those of uncontrolled sewage discharge) on a wetland ecosystem.

A large part of the oyster grounds in Terrebonne Parish have been closed because of pollution. Oysters are suspension feeders; that is, they filter suspended matter from water to obtain their food. Pollutants and pathogenic micro-organisms suspended in the water are concentrated in the oysters' tissues, rendering them unfit to eat.

The Louisiana State Board of Health maintains oyster-growing areas across the state, and regulates the oyster industry by prohibiting the sale of oysters taken from waters deemed unsafe. Determination is based on four parameters: concentration of coliform bacteria, heavy metal concentration, radioactivity, and ciguatera toxin. Details of the standards for oyster-growing areas can be found in a series of reports by the Health Department on oyster-water surveys. Figure 9

shows the approximate distribution and extent of actively-leased oyster grounds in Terrebonne Parish, and those parts closed to oyster harvesting by the Board of Health because of high coliform bacteria concentrations. Oyster habitat is generally limited to the zone between the mean 5 and 20 ppt isohalines (shown in Figure 9). The closed beds are in the central zone of oyster grounds, nearest to population centers. The total area closed has expanded toward the south and the west recently, growing from 35 sq mi in 1966 to 60 sq mi in 1972, and to the present level of about 80 sq mi in 1973. Construction of the Houma Navigation Canal has been cited as allowing polluted water from the Intracoastal Waterway to drain rapidly into oyster-growing grounds, thus causing the initial closure of the grounds (Louisiana State Board of Health, 1966). Even through an area is closed to oyster harvest, it can still be used as an oyster seed ground if the oysters are moved to clean water before their final harvest.

Oyster production in the parish has markedly declined in recent times, because of the following factors: 1) increasing sewage discharges have rendered productive oyster grounds unsafe; 2) salinity changes related to canalization have led to a decrease in the productivity of certain oyster grounds; 3) much formerly productive oyster bottom has been destroyed by dredging; 4) increasing fresh-water inputs from the Atchafalaya Basin (especially during exceptionally wet years, such as 1973) have caused the loss of natural reefs and oyster seed-grounds in the southwestern part of the parish; and 5) loss of wetland in the parish has presumably affected oyster production, just as it has negatively affected other fishery species that depend on a detritus-based food web.



SOURCE: COASTAL ENVIRONMENTS, INC. 1973.

FIGURE 9

MEAN SALINITY CONDITIONS AND LOCATION OF OYSTER GROUNDS IN TERREBONNE PARISH

N

MILES

0 1 2 3 4 5 6

- MAJOR HIGHWAY
- NATURAL BAYOU
- CANAL
- PARISH BOUNDARY
- AREAS OF RECENTLY ACTIVE OYSTER GROUNDS
- OYSTER GROUNDS CLOSED TO HARVESTING
- MEAN SALINITY (PARTS PER THOUSAND)

The parish's annual production between 1963 and 1973 averaged 12,429,000 lbs (meat weight). This was 10.5 percent of all Louisiana oyster landings during that period, and was obtained from 43,199 acres of active leases (Van Sickle, Reference 108). Thus, about 270 lbs of oyster meat per year were produced per acre of leased bottom. Total production (including sack oysters) may be more than twice as high, or up to 600 lbs/acre (Ford, personal communication).

2.4.2.3 Shrimp

a. Shrimp production. Two species of penaeid shrimp are economically important in Terrebonne Parish, the Brown Shrimp (Penaeus aztecus) and the White Shrimp (Penaeus setiferus). These shrimp are caught both in the estuaries of the basin and offshore, adjacent to the basin.

The shrimp harvest became commercially important in Terrebonne Parish after 1920, and peaked during the period 1941-1946, with the catch mainly consisting of White Shrimp. Subsequent declines in production coincided with extensive loss of wetland both within the parish and in the entire Louisiana coastal zone. Shrimp production increased following the construction of the Houma Navigation Canal, which allowed salinity intrusion to expand the area usable as nursery grounds. The Terrebonne area is now the center of inland Brown Shrimp production in Louisiana. From 1959 to 1974, the basin's total annual commercial shrimp harvest averaged over 13 million lbs (head off). Of this amount, about 74 percent was harvested inshore and 26 percent offshore.

b. Environmental factors important to shrimp production. The single factor influencing shrimp production that has been most affected by man is nursery-ground area, which translates

to wetland area, or the wetland-estuarine zone characterized by marsh areas interspersed with shallow water bodies.

Most estuarine organisms depend on the food web supported by detritus derived from wetlands; therefore, an unmistakable connection exists between wetland area and estuarine fishery production. Penaeid shrimp depend on coastal wetlands for food and protection during the juvenile stages of rapid growth, and are themselves an important component of the detritus food web. The relationship between penaeid shrimp and intertidal wetland area was determined by Turner (1977), who derived a formula for predicting the inshore shrimp yields in a given region. In the Terrebonne Basin, each acre of wetland is predicted to yield about 19 lbs of shrimp.

2.4.3 Vertebrates

2.4.3.1 Fishes. No detailed ichthyological data-base exists for the parts of Terrebonne Parish directly affected by constructing and operating of the proposed sewerage system. Based on experiences in adjacent, similar coastal areas (Demont, Reference 25; Bahr and Hebrard, Reference 4), and interviews with parish residents familiar with the local natural history, it was determined that the ichthyofauna consists of a complex mixture of freshwater, estuarine resident, and transient marine species.

The freshwater inhabitants are chiefly quiet- to sluggish-water lowland fishes, in addition to several ubiquitous forms (e.g., gizzard shads, carp, golden shiner, and channel catfishes). The principal species (which are basically restricted to lowland environments) are gars, bowfin, and several members of the sunfish family Centrarchidae. Freshwater species having particular commercial or sport value

include blue, channel, and flathead catfish, bowfin, buffalos, and yellow bass.

The estuarine residents are primarily anchovies, cyprinodonts (killifishes, topminnows, livebearers), silversides, pipefishes, mullets, gobies, and certain flatfishes (bay whiff, hogchoker). Although none of these species supports a fishery (aside from limited exploitation for bait), many have considerable ecological importance since they constitute a major forage-base for piscivorous fishes and birds, especially during summer and early autumn when the transient young of marine forms are less available.

The marine transient component is highly diverse and includes fishes demonstrating a wide variety of temporal and spatial patterns of occurrence in inshore waters during various phases of their lives. Of paramount importance are those species dependent upon inshore estuarine (and in some cases adjacent freshwater) areas as "nursery habitat." Economically important fishes having this general life cycle include the Gulf menhaden, the spot, and the Atlantic croaker.

Saltwater intrusion in some parts of Terrebonne Parish in recent decades seems to have generally increased the frequency, extent, and duration of inland penetration by many marine fishes, with a concomitant tendency for retreat by freshwater species (Coastal Environments, Inc., Reference 32; Larry de la Bretonne, pers. comm.). Predominantly freshwater fish communities tend to be north of the GIWW, a transitional zone of mixed freshwater and estuarine-marine assemblages is found along and immediately south of the GIWW, and predominantly estuarine-marine assemblages are found in the lower third to half of the Parish. Many species traditionally regarded as

"freshwater" or "marine" should be noted as, in fact, being broadly euryhaline and are likely to be encountered (at least seasonally) virtually anywhere along the gradient of conditions occurring in the project area.

2.4.3.2 Amphibians and Reptiles. The amphibian and reptilian communities generally show a decrease in diversity as the Gulf coast is approached. Relatively high salinities may well limit the herpetofaunal diversity in the coastal marshes (Bahr and Hebrard, Reference 4). Amphibians and reptiles enter into many complex food webs at numerous levels, ranging from the tadpole that eats decaying organic matter to the American alligator which has only man as a predator of the adult. Species abundance and diversity is greatest along ridges, which presumably provide a dispersal route as well as shelter (Tinkle, Reference 100; Hebrard and Mushinsky, Reference 47, and unpublished manuscripts Reference 48).

A list of amphibians living in the parish can be found in Conant (Reference 19) and in Liner (Reference 55).

Snakes, lizards, and turtles are abundant throughout most of southern Louisiana. The previously endangered American alligator has, over the past ten years, shown a significant increase in population, and is now classified as a threatened, rather than an endangered, species in coastal Louisiana.

a. American alligator (Alligator mississipiensis). Joanen (Reference 51) reported that in 1973 there were 200,682 alligators inhabiting about 8,000 square miles of available habitat in Louisiana, an average of 25.11 alligators per square mile of suitable habitat. Alligator populations at that time were stable or increasing in all but one parish (Plaquemine) in the state. In Terrebonne Parish, there were

estimated to be 9,088 alligators occupying 811.5 square miles of suitable habitat, an average of 11.2 individuals per square mile of habitat.

In January, 1977, most populations of the American alligator were reclassified from endangered to threatened status. This status change affected approximately 75 percent of the total alligator population, and included virtually all coastal areas throughout Florida, Georgia, Louisiana, South Carolina, and Texas. The remaining 25 percent of the population is still endangered, and includes some in the inland portions of Louisiana. The new status reflects the alligator's positive response to the strict conservation techniques applied. No commercial hunting is permitted, but they are now available for scientific research if the state authorities are in agreement (Endangered Species Technical Bulletin, 1977). The rapid increase in both local and total numbers is very strong evidence that food is very abundant in the alligator habitat.

2.4.3.3 Birds. About 320 species of birds occur in various parts of Terrebonne Parish during the year (Lowery, Reference 58; Hebrard, unpublished data). These birds may be broadly classified, according to their seasonal occurrence, as winter residents, summer residents, permanent residents, and migratory transients. Table 2 shows the number of species of birds that occur in the major natural habitats of the parish (Hebrard, unpublished data). Of the five endangered bird species that might occur in Louisiana, only three are likely to occur in Terrebonne Parish. The Brown Pelican is extinct in the parish.

a. Wading bird nesting colonies. In a 1976 survey (Portnoy, et al., Reference 73), researchers of the Louisiana Cooperative Wildlife Research Unit located 11 active breeding

TABLE 2

NUMBER OF BIRD SPECIES OCCURRING IN THE FIVE MAJOR NATURAL HABITATS OF TERREBONNE PARISH

	Winter	Summer	Permanent	Transient	Total
Swamp Forest	23	36	11	15	85
Fresh Marsh	40	18	14	16	88
Brackish Marsh	40	17	15	17	89
Saline Marsh	44	15	19	22	100
Bottomland Forest	41	44	31	24	140

colonies of seabirds and wading birds in Terrebonne Parish. Of these, nine are either directly on the coast, or are over 5 miles from the nearest proposed sewage pipeline. The two remaining are discussed below.

One very diverse colony was located near Lake Hatch, 2.3 miles due south of Waterproof and the proposed Bayou Black pipeline. This colony reportedly contained breeding pairs of the following species in 1976: Great Blue Heron, Snowy Egret, Great Egret, Louisiana Heron, Little Blue Heron, *Black-crowned Night Heron, *White Ibis, and Cattle Egret. The two species marked with an asterisk appear on the National Audubon Society's "Blue List," which indicates a consensus among ornithologists that populations of the species are declining in at least part of their geographic range. Another colony, consisting of a single species (Great Egret), was located 0.7 mile due south of Oak Forest and the proposed Bayou Black pipeline. These two colonies are shown in Figure 8, page 25.

b. Bald Eagle. Three recently-active nests of Bald Eagles are known in Terrebonne Parish (S. Ray Aycock, U.S. Fish and Wildlife Service, personal communication). One of these is located 0.4 mile northwest of the junction of People's Canal and Bayou Mauvais Bois, southwest of Lake Penchant. A second nest is located 0.8 mi. due south of Greenwood and the proposed Bayou Black pipeline, near the interface between wetland and more-elevated inhabited ground. The third nest is 1.5 miles east of Provost Cemetery and the proposed Bayou Grand Caillou force main. This nest is also located near the wetland/high-ground interface. The locations of these nests are also shown in Figure 8, page 25.

c. Peregrine Falcon. This species occurs in Louisiana from September through May, but is not known to have nested in the state in recent years (Lowery, Reference 58). The files in the Museum of Zoology at L.S.U. revealed no records of Peregrine Falcons in Terrebonne Parish. This undoubtedly reflects the bird's general rarity, but probably also reflects the lack of regular coverage of this part of the state by ornithologists. There are fairly regular winter records of Peregrine Falcon sightings in Cameron Parish and the Grand Isle area, both popular birdwatching areas.

2.4.3.4 Mammals. Of the four major wetland types, swamp forest, with 25 species, supports the greatest diversity of mammals. The number of species declines towards the coast. There are 14 species in fresh marsh, 11 in brackish marsh, and 8 in saline marsh. Undisturbed forested ridges of high ground may support up to 32 species of mammals (Hebrard, unpublished data). No endangered species of mammals are known to occur in Terrebonne Parish. The Red Wolf (Canis rufus) has no known population this far east in Louisiana.

Species of primary commercial importance are nutria, muskrat, raccoon, mink, and otter. An estimated average of 78,000 muskrat pelts and 125,000 nutria pelts are produced each year from Hydrologic Unit V (figures are calculated from catches of muskrat and nutria at Point au Chien Wildlife Management Area). Palmisano (Reference 70) reported on the relative abundance of these five species in saline through fresh marshes in southeastern Louisiana, but was not able to make estimates of abundance in swamp forest. He reported that muskrat abundance was greatest in brackish marsh, while nutria were found more frequently in fresh marsh. Raccoons were also most abundant in fresh marsh, and mink and otter were equally distributed between fresh and brackish marsh.

2.5 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

2.5.1 Archaeological Sites

There are a number of known archaeological sites within the parish which could be within the area of influence of the proposed project. Most of the archaeological sites within the parish consist of earth mounds and shell middens, and date from approximately 200 A.D. to historic times. Most of these sites are located on the natural levees along the smaller bayous in the parish.

Because of the natural forces of subsidence, erosion, and alluviation, many of the prehistoric sites have been either destroyed or lost. Also, since the activities of man have always been concentrated along the natural bayou ridges, highway and residential construction and agricultural activity over the last several decades have destroyed many of the archaeological sites.

2.5.2 Historic Sites.

Several historic sites exist within the project area, including the Southdown Plantation House, which is listed in the National Register of Historic Places. There are also several sites that are included in the state register of historic places, among them the Magnolia Plantation House, St. Joseph's Church, and Bell Grove Plantation.

2.5.3 Survey of Archaeological and Historic Sites.

A Level I Assessment and Preliminary Field Survey was conducted in Terrebonne Parish as a part of the Environmental Impact Statement study. This survey was coordinated with the Louisiana State Division of Archaeology and Historic Preservation, and included a thorough literature search and a field survey of all known archaeologic and historic

sites that could possibly be affected by the proposed project. The professional archaeologist performing the field survey submitted a final report which included an evaluation of each site inspected with regard to its potential to be impacted and also its eligibility for inclusion on the National Register. The findings of this investigation are presented in Section 5.5

2.6 SOCIOECONOMIC SETTING

The major factor shaping the current socioeconomic environment of Terrebonne Parish has been the discovery and development of vast petroleum resources in the area. Prior to 1930, the parish was a relatively slow-growing area devoted primarily to agriculture and fishing. Since then, it has grown at more than double the national rate, and has become one of the nation's leading producers of both oil and gas. These resources have significantly influenced the parish's population, land use, and employment characteristics.

2.6.1 Population

2.6.1.1 Present Population Trends and Characteristics. The parish growth rate has decreased steadily from a high of 4.0 percent annually between 1950 and 1960 to 1.8 percent annually between 1970 and 1977. Recent population trends by ward are shown on Table 3. (The parish wards and precincts are shown on Figure 10). Wards 5, 8, and 9 have shown the highest growth rates over the past seven years, while the largest absolute population gains occurred in Wards 1 and 3, the Houma-Thibodaux corridor. Wards 4, 6, 7, and 10, which contain the five major southern bayous, have all shown growth rates lower than the parish average.

TABLE 3

POPULATION TRENDS BY WARD
TERREBONNE PARISH

Ward	1960 Population	Average Annual Gain 1960-1970 (percent)	1970 Population	Average Annual Gain 1970-1977 (percent)	1977 Population
1	5,040	9.1	9,635	3.9	12,240
2	1,738	-2.3	1,345	-1.2	1,228
3	34,586	1.9	41,243	1.1	44,423
4	3,976	1.9	4,739	1.2	5,138
5	1,499	3.7	2,053	8.8	3,313
6	2,938	0.7	3,139	0.7	3,286
7	5,368	2.2	6,573	1.0	7,055
8	2,183	0.9	2,390	4.1	3,078
9	1,590	2.2	1,934	5.7	2,711
10	1,853	6.2	2,998	1.4	3,284
TOTAL	60,771	2.5	76,049	1.8	85,816

Source: Terrebonne Parish Police Jury

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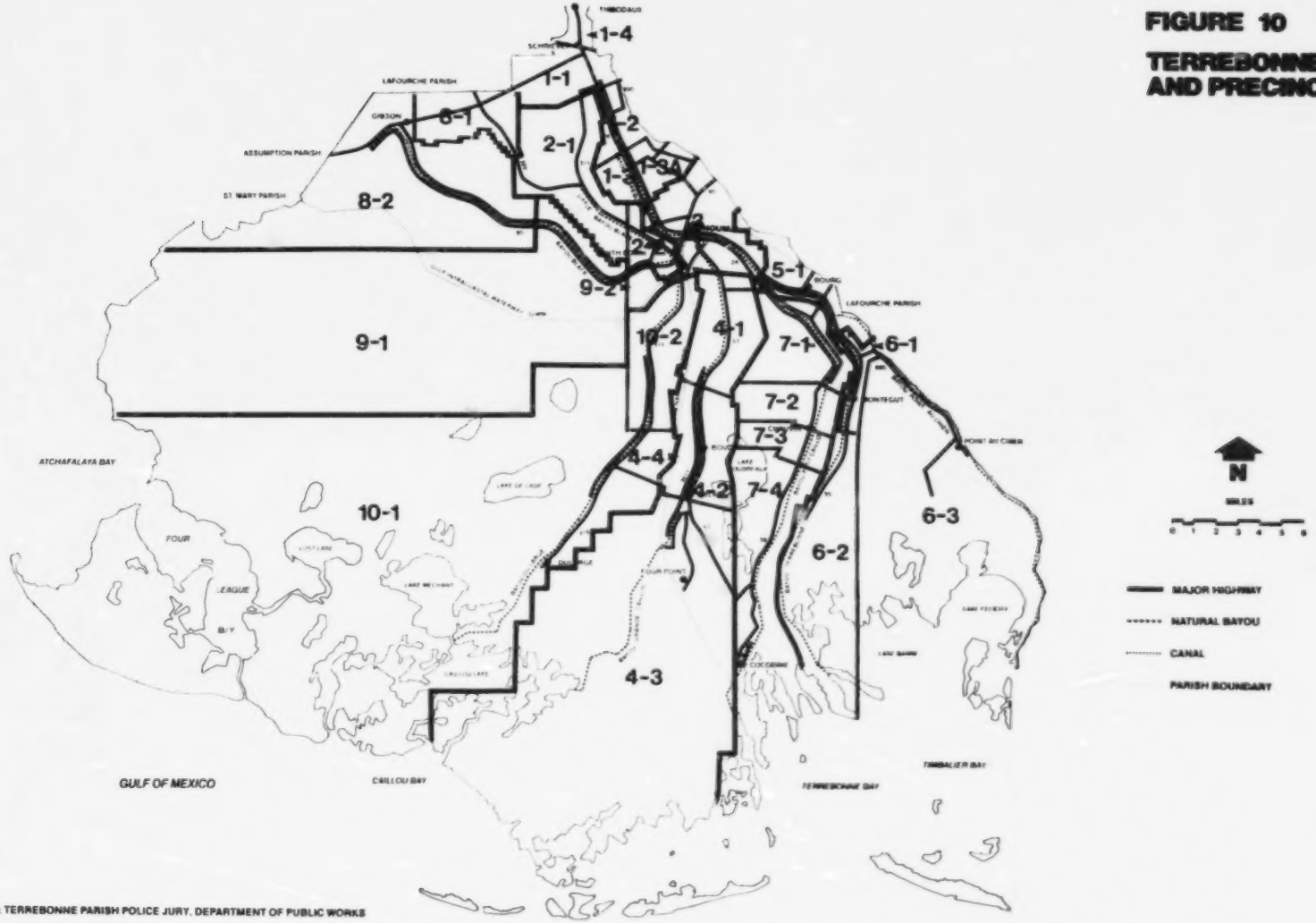
FIGURE 10

TERREBONNE PARISH WARDS AND PRECINCTS



SOURCE: TERREBONNE PARISH POLICE JURY, DEPARTMENT OF PUBLIC WORKS

Nearly two-thirds of the parish's population live in Wards 1 and 3, which are comprised of the City of Houma and the corridor along Highway 24 toward Thibodaux. The population south of the GIWW is located almost exclusively on the high ground along the major bayous, with Bayous Petit Caillou and Grand Caillou being the most populous. The number of individuals per household in Terrebonne Parish averages 3.54.

2.6.1.2 Project Design Population Projection. As a basis for the wastewater system design, a population projection for the parish was developed. The basic assumption underlying this projection is that the number of households in the Parish will continue to grow at the same rate it did between 1963 and 1971. In implementing this methodology, the project area was divided into 34 service areas, and straight-line projections were developed for each area. The base data used was the number of water supply connections in each service area. The projected number of water-service connections (households) was then converted to an equivalent number of persons by multiplying by a projected population per household ratio taken from an independent projection of Louisiana populations by parish developed by the University of New Orleans (reference 79). Table 4 presents the resulting parish population projection. For purposes of project design, this projection was broken down into the 34 individual service areas listed in Table 5.

2.6.1.3 Other Population Projections. In addition to the project design projection, five other projections produced by various researchers and government agencies were examined. These projections, and the actual population of Terrebonne Parish, are presented in Table 6, and are shown graphically in

TABLE 4

PROJECTED POPULATION
TERREBONNE PARISH

YEAR	POPULATION
1970	77,165
1975	81,300
1980	93,946
1985	100,802
1990	109,541
1995	118,117
2000	127,540

Source: Table C.2-5 (Revised), Amendment I to Facility Plan Report Supplement, G.S.T. Engineers, June, 1978.

TABLE 5

HOLDING BASIN SERVICE AREA POPULATION PROJECTIONS

Area No.	Service Area	1975	1985	1995
1	Cocodrie	245	289	357
2	Boudreaux	3,649	4,305	5,298
3	Dulac	851	1,004	1,233
4	Chauvin #1	3,752	4,418	5,452
5	Chauvin #2	164	203	238
6	Point-Au-Chien	836	986	1,213
7	Montegut	1,364	1,610	1,980
8	St. Peters	1,292	1,525	1,876
9	Smithridge	2,361	2,786	3,428
10	Bayou Dularge	862	1,017	1,252
11	Theriot	801	945	1,164
12	East Coteau and Bayou Blue #1	1,499	1,769	2,178
13	East Coteau and Bayou Blue #2	298	352	431
14	Sunrise-Crozier #1	544	642	790
15	Sunrise-Crozier #2	570	673	828
16	Gray	2,855	3,369	4,148
17	Schriever	5,083	5,998	6,856
18	Bayou Blue	998	1,187	1,450
19	Coteau	1,706	2,013	2,649
20	Humphreys	977	1,153	1,420
21	Greenwood	628	741	912
22	Gibson	1,245	1,469	1,810
23	Donner-Chacahoula	662	781	961
24	Ellendale	334	823	1,015
25	Southdown #1	403	476	593
26	Southdown #2	817	1,964	2,927
27	Presque Isle	1,881	2,220	2,732
28	Ashland #2	265	329	385
29	Ashland #1	492	581	715
30	Bayou L'ourse	450	506	655
31	Four Point	73	86	110
32	Isle de Jean Charles	187	221	273
33	City Sewer Service Area	31,824	40,990	44,325
34	North Waste Treatment Plant	11,332	13,371	16,463
		81,300	100,802	118,117

SOURCE: Table C.2.-7 (Revised), Amendment I to Facility Plan Report Supplement, G.S.T. Engineers, June, 1978.

TABLE 6

POPULATION PROJECTIONS - TERREBONNE PARISH

	PROJECTION NUMBER						
Year	1	2	3	4	5	6	Actual
1970	77,165		76,047		76,049		76,049
1975	81,300	87,106	87,000		82,020	80,522	
1977							85,816
1980	93,946	99,750	93,804	103,000	88,379	85,823	
1985	100,802	112,322	108,000		95,821	91,361	
1990	109,541	125,000	119,000	134,000	103,484		
1995	118,117	137,500	130,000		108,338		

Projection Number	Source
1	Amendment I to Facility Plan Report Supplement, GST Engineers, June 1978.
2	Feasibility Report for Sanitary Landfill Operations in Terrebonne Parish, T. Baker Smith & Son, Inc., May 1977.
3	Water Quality Management Plan: Terrebonne Basin, Pollution Control Engineering, Inc., n.d.
4	Comprehensive Plan, Houma-Terrebonne Parish, 1972-1973, Diversified Economic & Planning Associates, Inc., May 1973.
5	Projections to the Year 2000 of Louisiana Population and Households, H. Segal, et al, 1976.
6	Population Projections by Age, Race, and Sex for Louisiana and Its Parishes, 1970-1985, R. L. Burford and S. G. Murzyn, n.d.

Figure 11. As Figure 11 shows, the project design population projection appears to be reasonable compared to the other projections.

The assumption of continued growth for Terrebonne parish is based upon increases in the oil- and gas-related manufacturing sectors, the transportation and construction industries, and the development of Houma as a regional commercial center. The effect of these areas of strong economic growth will be balanced to some extent by a leveling-off of onshore oil and gas production, decreases in the fertility rate, and by the increasing numbers of women entering the labor pool, thereby reducing the effect the employment increases have on population growth.

2.6.2 Land Use

The major determinant of land use in Terrebonne Parish is the topography. Although the parish is the second largest in the State of Louisiana in terms of gross area, it ranks among the lowest in usable land area because of the vast amount of low-lying marsh and estuary. Of the 1,470,885 acres within the parish, 1,264,887 acres, or about 86 percent, are classified as either open water or wetland areas. The remaining usable land is located almost entirely on the higher natural ridges which have formed along the bayous.

2.6.2.1 Existing Land Use. The results of two independent surveys of current land use in Terrebonne Parish are presented in Tables 7 and 8. These two land-use tabulations contain a number of discrepancies, some of which are attributable to the use of different data-categories, and some to differences in the data-collection method. As these Tables show, the percentage of developed land is on the order of 1 percent of the

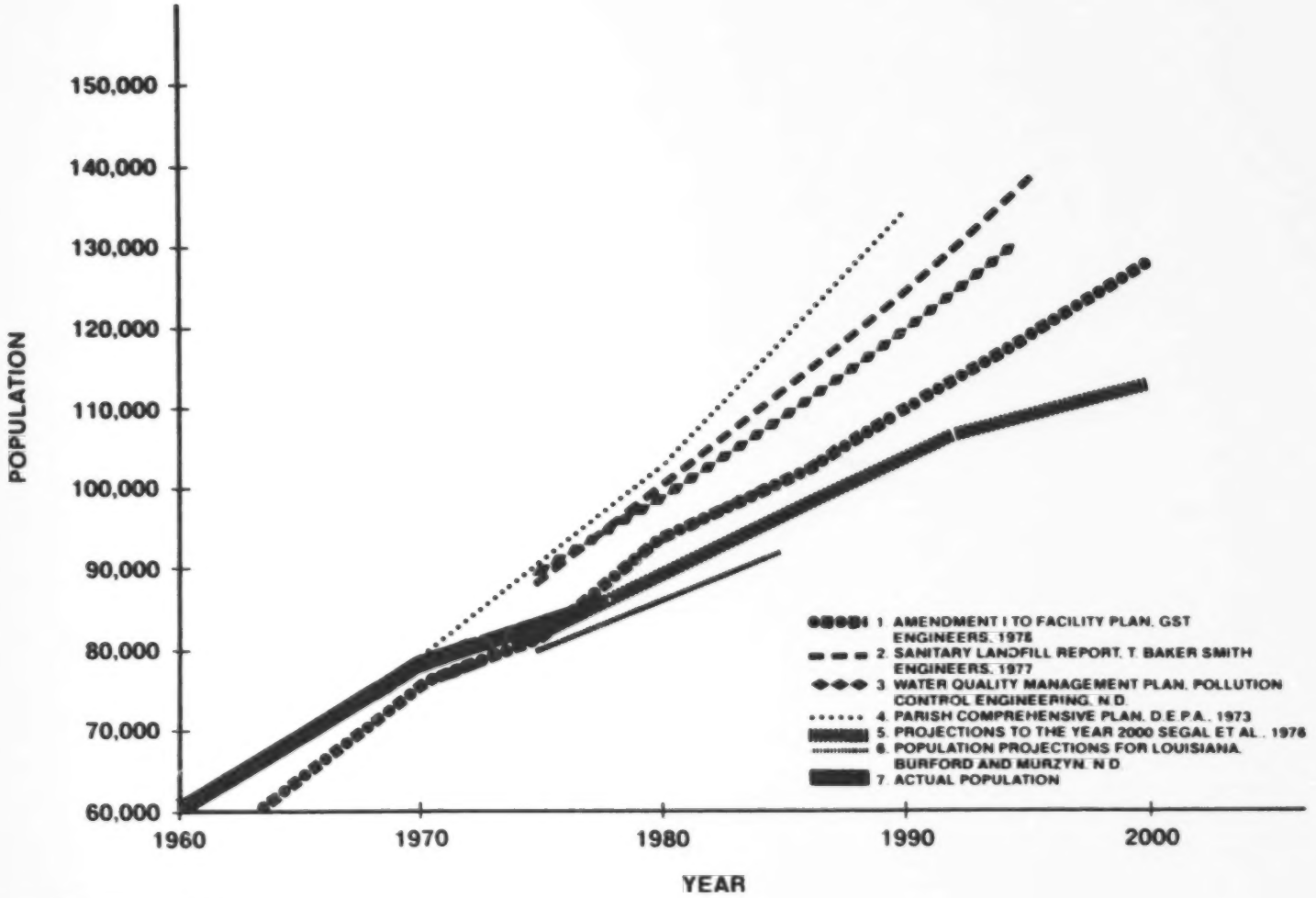


FIGURE 11
TERREBONNE PARISH POPULATION PROJECTIONS

TABLE 7

LAND USE IN TERREBONNE PARISH, 1972
LOUISIANA STATE PLANNING OFFICE

Land Use Category	Acres	% of Total
Developed Land	17,537	1.2
Residential	5,434	0.4
Strip and Clustered Settlement	7,904	0.5
Commercial and Services	1,482	0.1
Industrial	1,729	0.1
Transportation, Communication, and Utilities	741	0.1
Open and Other	247	0.1
Extractive	95,589	6.5
Agricultural Land	55,328	3.8
Forest Land	21,242	1.4
Barren Land	16,302	1.1
Beaches	741	0.1
Other	15,561	1.1
Wetland	649,610	44.2
Forested	90,155	6.1
Nonforested	559,455	38.0
Water	615,277	41.8
Streams and Waterways	7,410	0.5
Lakes	67,431	4.6
Reservoirs	247	0.1
Bays and Estuaries	239,837	16.3
Others	300,352	20.4
TOTAL	1,470,885	100.0

Source: Louisiana State Planning Office, Baton Rouge, 1975.

TABLE 8

LAND USE IN TERREBONNE PARISH, 1972
HOUMA-TERREBONNE REGIONAL PLANNING COMMISSION

Land Use Category	Acres	% of Total
Developed Land	14,080	1.0
Residential	9,884	0.7
Commercial	1,387	0.1
Public and Quasi-Public	622	0.1
Recreation	43	0.1
Industrial	325	0.1
Utilities	170	0.1
Transportation	1,649	0.1
Agricultural and Vacant	876,159	59.5
Water[a]	580,646	39.5
TOTAL[b]	1,470,885	100.0

a This figure assumed by subtracting all areas previously accounted for from the total.

b This figure assumed from the Louisiana State Planning Office data.

Source: Comprehensive Plan, Houma-Terrebonne Parish, 1973.

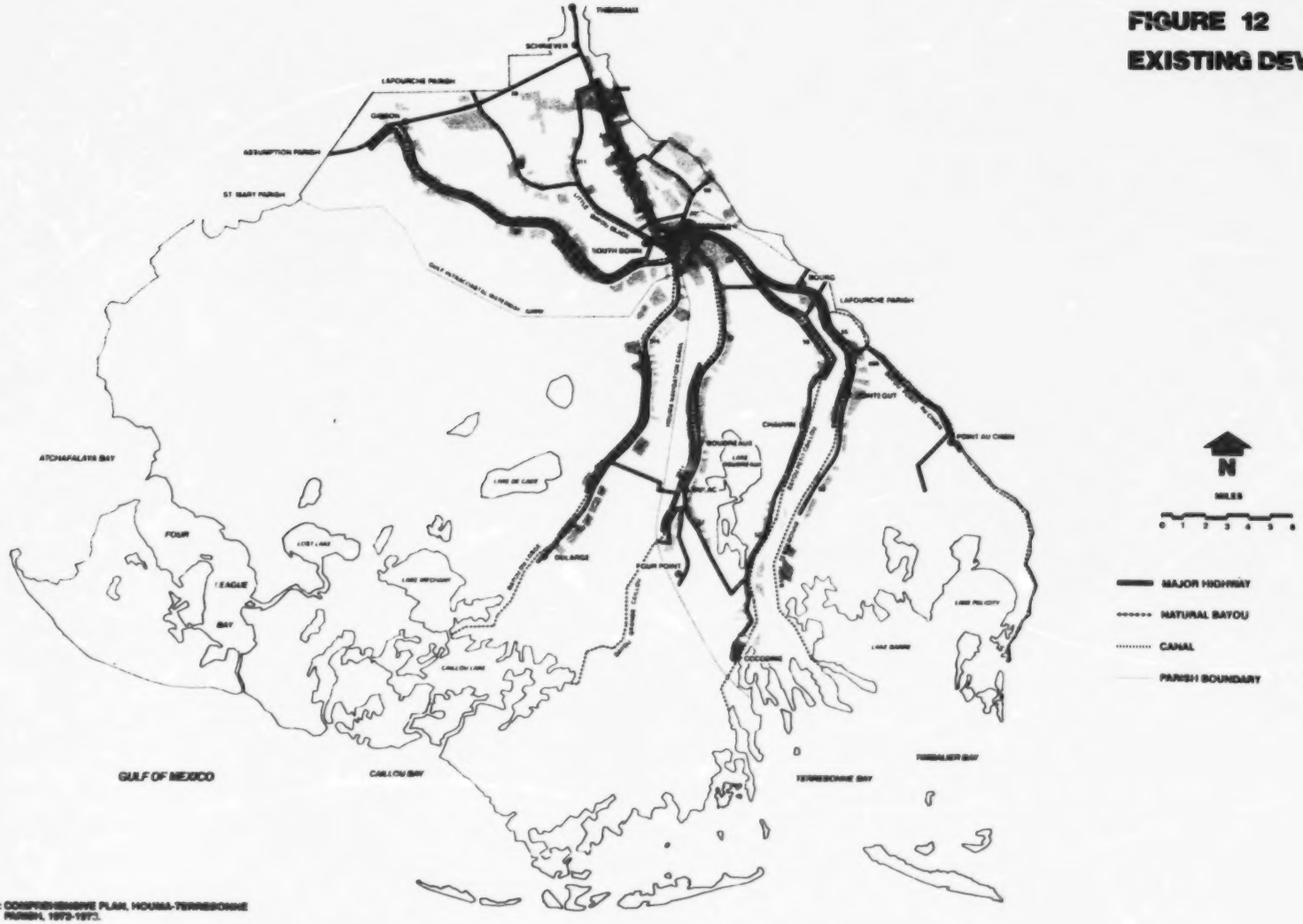
total parish area. The areas developed by 1973 are presented in Figure 12. As this exhibit shows, the developed lands are centered on the City of Houma and radiate outward along the bayou ridges. The northern corridor between Houma and Thibodaux is the most densely developed of the outlying areas. Development along the bayous to the south is primarily residential, although there are a number of seafood processing plants and several offshore-oil service facilities in the lower reaches. Heavier industry is generally located in the suburban areas around Houma.

2.6.2.2. Future Land Use. Two estimates of future land-use requirements have been developed in the past several years. The first is the land-use plan contained in the Houma-Terrebonne Parish Comprehensive Plan. The second is presented in the Coastal Parish Management Program, First Year Planning Study, Terrebonne Parish, Louisiana, prepared by VTN Louisiana, Inc. in June 1977. The distribution of the development projected in the Comprehensive Plan is shown on Figure 13.

The land-use projections developed in the Coastal Parish Management Program report call for some 7,500 additional acres of development by 1985. Of this total, about 70 percent is expected to be land converted from agricultural use. To satisfy this expected demand, the report states there are over 87,000 undeveloped acres within those parts of the parish where it is felt that growth will not be detrimental to the coastal wetland environment (Reference 14).

2.6.2.3. Real Estate and Housing. The real estate and housing markets in Terrebonne Parish are relatively tight, particularly in Houma and the surrounding area. The major reasons are the relative scarcity of prime developable land and a

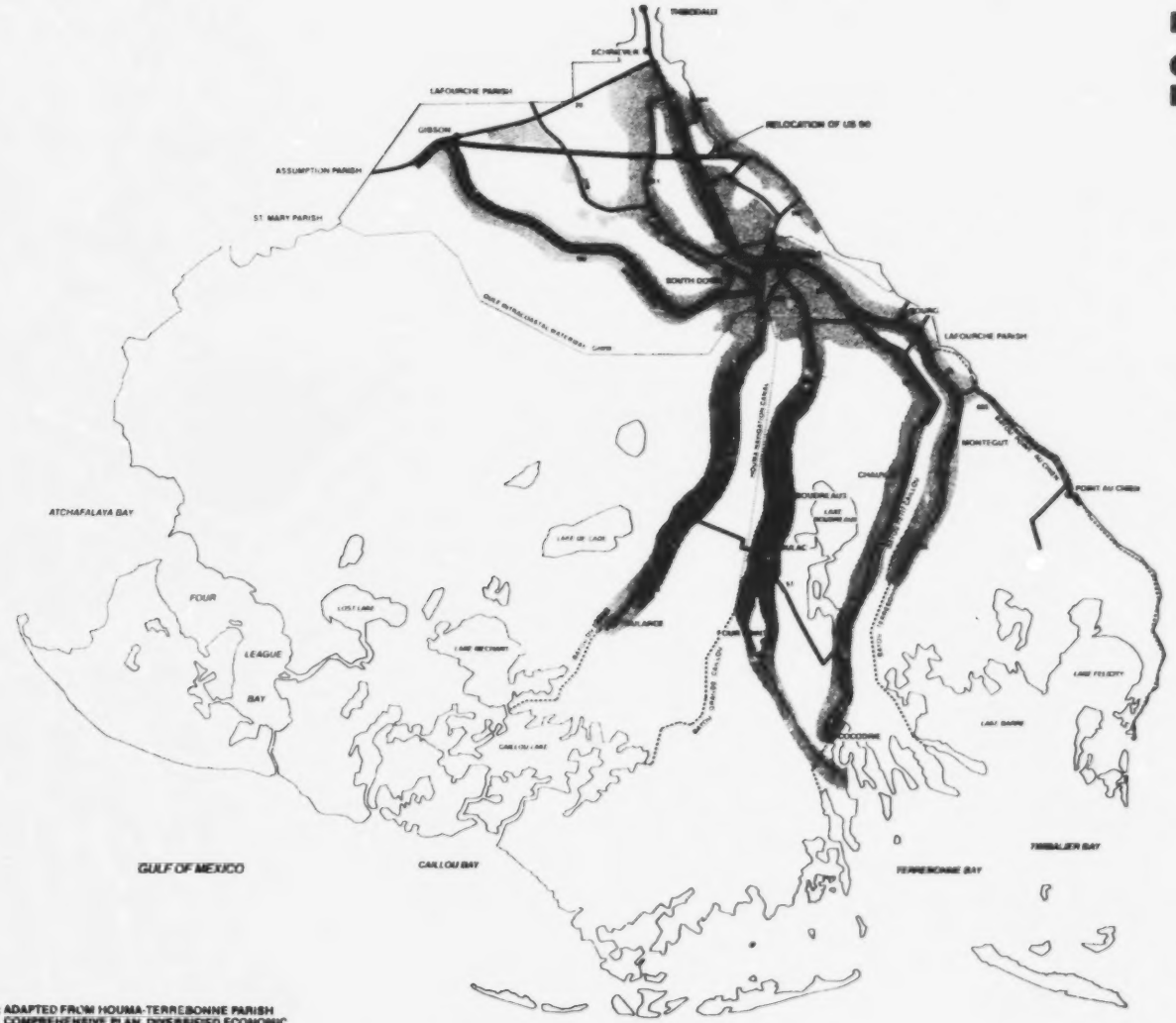
FIGURE 12
EXISTING DEVELOPED AREAS



SOURCE: COMPREHENSIVE PLAN, HOUMA-TERREBONNE PARISH, 1972-1973.

FIGURE 13

COMPREHENSIVE PLAN PROJECTED DEVELOPED AREA-1990



- MAJOR HIGHWAY
- NATURAL BAYOU
- CANAL
- PARISH BOUNDARY

SOURCE: ADAPTED FROM HOUMA-TERREBONNE PARISH COMPREHENSIVE PLAN, DIVERSIFIED ECONOMIC AND PLANNING ASSOCIATES, INC., 1973.

combination of economic conditions inhibiting the development of suitable land. Much of the prime developable land around the City of Houma is closely held by a small number of landowners, including oil companies, land companies, and families with extensive sugarcane field holdings (References 91 and 92). The possibility of leasing the mineral rights to this undeveloped land at up to $250 per acre makes it economically viable for many of these landowners to hold their land in an undeveloped status rather than sell it to a developer (Reference 90).

The major forces of development expected in Terrebonne Parish are focused principally in the Houma-Thibodaux corridor. Other large developments are also expected west of town as land is taken out of agricultural use, and to the east to serve those involved in the construction of offshore superport facilities.

Little pressure for development is expected south of the Intracoastal Waterway (References 91 and 92). Factors contributing to this are the relative scarcity of dry land, the distance from markets and suppliers, and the somewhat poorer transportation access caused by the limited number of bridges across the Intracoastal Waterway and between bayous.

2.6.2.4 Comprehensive Planning in Terrebonne Parish. The Houma-Terrebonne Regional Planning Commission (HTRPC) does all the comprehensive planning for Terrebonne Parish. The principal planning documents presently used by the parish are the 1973 and 1974 Comprehensive Plans prepared by Diversified Economic and Planning Associates, Inc. These plans contain population and land-use projections, described previously, and a capital-improvement program for the parish. The HTRPC has

no implementation authority, but serves in a technical advisory role to the Terrebonne Parish Police Jury. The commission is in complete accord with the proposed sewerage project (see Appendix A, Item 3).

The South Central Planning and Development Commission (SCPDC), Thibodaux, Louisiana, is the area-wide HUD planning agency for Terrebonne, Assumption, Lafourche, St. James, St. John and St. Charles parishes. The SCPDC is mandated by a gubernatorial proclamation, and provides technical planning assistance to agencies within its area. This assistance includes preparing land-use and housing plans, coastal zone management programs, Community Development blockgrant applications, and EDA grant applications. The SCPDC serves Terrebonne Parish in an advisory role.

Regulatory powers for Terrebonne Parish are vested in the Police Jury. The Police Jury has recently passed an amended Land Use and Control Measures Ordinance (Ordinance No. 1861, amended), which prescribes minimum requirements for the use of flood-prone areas, as determined by the Federal Insurance Administration. Generally, this ordinance requires all new developments to have a first-floor elevation no lower than the elevation of the 100-year flood. Since there is very little land south of the Intracoastal Waterway with an elevation above that of the 100-year flood, any development within the floodplain must be built upon fill. The added costs of the required fill will discourage development in these areas to some extent. The areas of Terrebonne Parish within the 100-year floodplain are shown on Figure 5.

The City of Houma presently has a zoning ordinance, but there is no zoning in the remainder of the parish. In a

parish-wide referendum held on November 12, 1977, the voters defeated a general parish zoning-ordinance proposal by a margin of about 1.6 to 1. Without such an ordinance, the Parish has very limited ability to control or influence development patterns.

2.6.3 Projects by Others. There are a number of projects at the national, state, and local levels which could interact with the proposed sewerage treatment facilities.

2.6.3.1 Federal Projects. The U.S. Army Corps of Engineers operates and maintains a number of inland navigation projects within Terrebonne Parish, including the Gulf Intracoastal Waterway, the Houma Navigation Canal, and Bayous Grand Caillou, Petit Caillou, and Terrebonne. Some of the proposed sewers are planned to cross these waterways, and coordination will be required to insure that they do not interfere with maintenance and dredging operations. All sewerage facility construction in wetlands or navigable waters requires permits from the Corps of Engineers.

2.6.3.2 State Projects. The State of Louisiana is presently in the process of relocating U.S. Highway 90 north of Houma. This project is expected to attract new residential and commercial development, particularly at interchanges. The proposed alignment for the relocated U.S. Highway 90 is shown on Figure 13.

2.6.3.3 Local Projects. Terrebonne Parish is currently implementing a parish-wide forced-drainage project. This project involves a total area of 115,333 acres in 47 individual project areas. The U.S. Army Corps of Engineers has required an environmental impact statement as a part of the discharge-permit application for 33 of the forced-drainage

areas. The parish is presently preparing a draft environmental impact statement for these areas. All of the 14 areas not covered by the EIS have been completed and are in operation, draining a total of 19,570 acres. Six of the project areas subject to the EIS have also been completed, but are not being operated pending approval of the discharge permit applications. These six projects total 10,960 acres. An emergency permit has recently been granted by the Corps of Engineers to allow construction of project area 1-1A, between Little Bayou Black and Bayou Terrebonne. This project will drain 12,600 acres.

While much of the area included in the forced drainage projects consists of previously developed areas of the parish, as much as 45,000 acres of presently undeveloped land will be made usable by this project (Reference 74). This land now consists of bottomland hardwoods, swamps, and marshes which, if the forced-drainage facilities are operated to maximum drawdown capacity, will become relatively dry and suitable for residential or commercial use. Those parts of the parish included in the forced-drainage project are shown on Figure 7.

2.6.4 Employment

2.6.4.1 Present Employment. Employment characteristics of Terrebonne Parish are shown in Table 9. Parish employment showed substantial increases in all major occupational sectors between 1972 and 1977. The ten largest employment categories in the parish are shown in Table 10. As this table shows, the extraction of petroleum products and the manufacture of ships and equipment for this extraction play a very major role in the parish economy.

2.6.4.2 Outlook for Major Employment Sectors. This section

TABLE 9

EMPLOYMENT TRENDS
1972 TO 1977

Item	1972	September 1977	Net Change	% Change
Civilian Labor Force	26,100	33,975	7,875	30.2
Employment	24,625	32,725	8,100	32.9
Unemployment	1,475	1,250	-225	-15.3
Rate of Unemployment	5.6	3.7	-1.9	-33.9
Non-Agricultural Wage and Salary	23,250	31,450	8,200	35.3
Manufacturing	3,450	4,725	1,275	37.0
Durable Goods	2,200	3,225	1,025	46.6
Non-Durable	1,250	1,500	250	20.0
Non-Manufacturing	19,800	26,725	6,925	35.0
Mining	4,300	6,150	1,850	35.0
Construction	1,125	1,650	525	46.7
Transportation, Communication, & Utilities	2,375	3,725	1,350	56.8
Trades	5,900	7,625	1,725	29.2
Finance, Insurance, & Real Estate	650	950	300	46.2
Service & Misc.	2,900	4,125	1,225	42.2
Government	2,550	2,500	-50	-2.0
Other Employment	1,375	1,275	-100	-7.3

SOURCE: Louisiana Department of Employment Security, Baton Rouge, Louisiana.

TABLE 10

EMPLOYMENT TRENDS FOR THE
TEN LARGEST EMPLOYMENT CATEGORIES
1976 AND 1977

SIC CODE	INDUSTRY GROUP	1976	1977	NET CHANGE	% CHANGE
13	Petroleum Products	6,225	6,183	- 42	- 0.7
51-59	Retail Trade	5,558	6,208	+ 650	+ 11.7
73-89	Services	2,828	3,394	+ 566	+ 20.0
37	Shipbuilding	2,084	1,934	- 150	- 7.2
50	Wholesale	1,651	1,428	- 223	- 13.5
44	Water Transport	1,416	1,364	- 52	- 3.7
34	Fabrication	765	1,691	+ 926	+121.0
17	Contracting	720	457	- 263	- 36.5
16	Highway Construction	611	831	+ 220	+ 36.0
42	Trucking	492	470	- 22	- 4.5
		22,350	23,960	+1610	+ 7.2

SOURCE: Louisiana Department of Employment Security,
Houma, Louisiana

provides a general perspective of existing employment and growth potential for the major employment sectors within the parish.

a. Mineral Production

Mineral production, particularly the extraction of oil, has been the basis of economic development in Terrebonne Parish since 1929. Although traditionally the second most productive parish within Louisiana (reference 38), the parish's total production of oil and associated products has continually declined since 1970. In part, this can be attributed to economically-motivated cutbacks in production and increased difficulty of extraction from deeper wells. Industry-wide activity to discover new sources at ever-increasing depths continues in earnest. Oil companies continue to purchase available mineral leases, expecting that deep wells will soon be economically feasible.

About 35 percent of south Louisiana's total inland oil reserve is estimated to have already been tapped (reference 93). Based on existing technology, it is estimated that at least half of the remaining reserve can also be retrieved. Assuming that it will take half as long to extract this remaining reserve as was needed to remove the first 35 percent, about 25 years will be required to deplete the supply of inland oil. Given substantial advances in technology or very intensive production, this 25-year period might be cut in half. However, the inland supply, coupled with the off-shore oil and gas reserves, would seemingly allow the petroleum industry an additional 20 to 25 years of production, thus maintaining the single most important economic force in the Parish through the design year of the proposed project.

b. Petroleum-Related Manufacturing

In recent years, the City of Houma has developed into an oil-industry support center for much of the Gulf Coastal region. Major fabricators and shipyards in the parish supply oil drilling and production operations within a radius of approximately 150 miles (reference 93). As shown in Table 10, three of Houma's ten largest employment sectors are involved in some aspect of this support activity. These figures indicate that the Houma-Terrebonne economy is no longer dependent solely upon the extraction of oil within the parish, but has become a service and equipment manufacturing center for the oil industry in a large portion of the Gulf Coast. In fact, Terrebonne Parish is now supplying drilling equipment to oil fields in the North Sea, Malaysia, and other off-shore fields around the world. This sector of the parish's economy should also continue to prosper as energy demand increases.

c. Commercial Fishing

Commercial fishing is a very important element of the Houma-Terrebonne economic structure. There were an estimated 2,000 full-time and 1500 part-time commercial fishermen within the parish in 1976 (reference 95). The number of full-time fishermen alone makes fishing the fourth most common occupation in the parish.

Terrebonne Parish is Louisiana's most important fishing location (reference 95) in terms of total value. The 1975 catch was valued at $32 million. The Dulac-Chauvin port has been the most important port in the state for commercial landings. According to the National Marine Fisheries Service, its total 1975 landings amounted to 204,208,000 lbs and were valued at $19,834,000. These figures make the Dulac-Chauvin

port the 4th most prominent port in the U.S. in terms of total volume and 6th in terms of the total value of all fish landings (reference 95).

Shrimp is by far the most important parish catch. As shown in Table 11, landings reached a peak in 1971, and declined during the next two years. Since 1974, however, the total catch has been increasing. The value to the shrimp fishermen in 1976 was almost $22 million (reference 95). Oysters are another very important parish seafood catch. As of 1976, a total of 2,351,461 lbs., valued at over $1.5 million, were taken by parish fishermen (reference 94). Other seafood landings important to the parish include menhaden, crabs, and fin fish. The parish has some 20 seafood processing plants (reference 95). Commercial fishing is expected to remain a major part of the parish economy.

d. Agriculture

According to the 1969 Census of Agriculture, the total value of farm products (sold by farms with sales of $2,500 and over) in the parish was $3,944,000, or an average of $33,144 per farm. Crops accounted for 93.6 percent of the total sales (reference 95), while livestock, dairy, and egg production accounted for the remaining 6.4 percent. The principal parish crop is sugarcane. Within recent years, however, total cropland, total cane acreage and total cane production have declined somewhat from the 1970 record year, as shown in Table 12. The primary reason for these declines has been the falling price of raw sugar caused by competition from foreign suppliers (reference 90). Because it has become increasingly difficult to return a profit, many cane farmers

TABLE 11

YEARLY SHRIMP LANDINGS
1970 TO 1976

YEAR	TOTAL LANDINGS (LBS)
1970	16,245,385
1971	17,320,805
1972	15,026,617
1973	10,494,768
1974	11,828,000
1975	12,120,151
1976	16,312,831

SOURCE: U.S. Fish and Wildlife Service, Houma, Louisiana

TABLE 12

SUGAR CANE PRODUCTION
1939 TO 1977

CROP YEAR	TOTAL CROPLAND	ACREAGE IN SUGAR CANE	NO. OF FARMS	TONS PRODUCED	DOLLARS PER NET TON
1939		18,271.8	510	319,461.4	$ 3.9
1945		20,546.5	316	412,270.1	$ 6.7
1950		21,727.9	168	352,292.3	$ 9.2
1955		17,227.4	109	435,743.7	$ 7.4
1960		18,759.1	85	368,674.7	$ 8.4
1965		21,174.2	108	384.666.6	$ 8.7
1970	47 840	24,124.7	69	564,363.8	$ 10.6
1971		20,758.8	67	384,192.3	$ 11.7
1972		21,042.7	63	413,054.7	$ 11.4
1973		23,439.0	57	312,854.1	$ 16.2
1974	38,545	14,338.8	51	303,015.5	$ 52.1
1975		19,183.1	51	316.663.5	$ 17.1
1976		18,144.1	51	398,388.0	$ 12.4
1977		18,303.7	49	(Not Available)	-

SOURCE: Personal Communication, Mr. Merlin T. Bascle,
U.S. Department of Agriculture, Houma, Louisiana.

have gone out of business, or have been assimilated into larger operations. Other crops include string beans, irish and sweet potatoes, soybeans, shallots, cabbage, and sweet corn (reference 95). The recent gradual decline of agriculture is expected to continue.

2.6.5 Other Socioeconomic Characteristics

2.6.5.1 Income. Average employment and weekly wages for Terrebonne Parish are shown in Table 13. The adjusted weekly wage has increased by approximately 6.3 percent since the base year of 1972. Family income distribution is shown in Table 14 Only 12.2 percent of the parish population had family incomes below $3,000 per year in 1970, compared to 27.8 percent in 1960 (reference 102). The median family-income was $8,338 in 1970, while in 1960 it was $4,831.

2.6.5.2 Public Services. Terrebonne Parish and the City of Houma are supplied with a full range of public services. Public water supply, electricity, and natural gas service are available throughout nearly the entire parish. Police and fire protection are also supplied throughout the parish, and are considered adequate for the present conditions. The parish is served by both public and parochial school systems. The educational system has no major problems at the present time.

2.6.5.3 Terrebonne Parish Financial Characteristics. Terrebonne Parish is a financially-sound governmental entity. It has an AAA general obligation bond rating and a history of continually increasing assessed property values. In 1960, the total parish assessed value was $56,755,180; by 1970, it had more than doubled to $118,874,000; and by 1977, it was $167,663,425.

2.6.6 Existing Sewerage Facilities

2.6.6.1 Treatment Plants. There are 7 publicly-owned, and at least 66 privately-owned, treatment facilities in the project

TABLE 13

AVERAGE EMPLOYMENT AND WAGES
IN TERREBONNE PARISH
1972 TO 1977

Year	Average Covered Employment	Average Weekly Wage	Adjusted Weekly Wage (1972 Dollars)
1972	20,775	151.55	--
1973	22,901	160.97	151.47
1974	23,514	179.39	152.12
1975	26,113	196.77	152.89
1976	28,124	215.47	158.37
1977	28,147	227.50	161.07

* First Quarter Only

Source: Louisiana Department of Employment Security, Baton Rouge, LA

TABLE 14

FAMILY INCOME CHARACTERISTICS
IN TERREBONNE PARISH

1970

Annual Income Levels	Number	Percent
UNDER - $1,000	562	3.2
$1,000 - $1,999	815	4.7
$2,000 - $2,999	746	4.3
$3,000 - $3,999	983	5.7
$4,000 - $4,999	833	4.8
$5,000 - $5,999	1,349	7.8
$6,000 - $6,999	1,411	8.2
$7,000 - $9,000	4,632	26.8
$10,000 - OVER	5,967	34.5
TOTAL FAMILIES	17,298	100.0

SOURCE: U. S. Bureau of the Census, 1970.

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2. Notice of Intent, June 20, 1977
3. Houma-Terrebonne Regional Planning Commission Comments on the Sewerage Facility Plan
4. Original Negative Declaration, February 5, 1977
5. National Wildlife Federation Comments on the Negative Declaration
6. Sierra Club - Delta Chapter Comments on the Negative Declaration
7. Ecology Center of Louisiana, Inc. Comments on the Negative Declaration

area. On-site inspections of the major facilities were made in October, 1977.

The significant findings of the investigation are:

1) few, if any, of the existing systems are currently meeting all the requirements of their present NPDES permits, much less the definition of secondary treatment (30 mg/l BOD_5, 30 mg/l suspended solids (SS), and 200 fecal coliforms/100 ml);

2) none of these systems can meet the 5 mg/l BOD_5, 15 mg/SS, 70 total coliforms/100 ml standards now being required for the area;

3) much of the parish has no off-site treatment facilities at all;

4) many of the facilities serving commercial establishments consist of only a septic tank and oxidation pond; and

5) oil- and gas-well facilities consist primarily of oily water separators.

2.6.6.2 Existing Sewers. Only 57.7% of the houses in Terrebonne Parish are served by a public or private sewer system. The vast majority of these sewers are in either the City of Houma or the Sewerage District 12 and 13 service area. Both of these areas are included in the modified Negative Declaration, and are therefore not properly a subject of this EIS.

3. ALTERNATIVES

3.1 ALTERNATIVES CONSIDERED BY THE APPLICANT

3.1.1 Selection Process

Several alternatives were considered in developing the proposed project. A four-step process was used in developing the alternative proposed.

3.1.1.1 Consideration of On-Site Treatment. The initial step in the alternative selection process was a consideraton of on-site sewage treatment systems. However, the high water table and poor drainage in most areas of Terrebonne Parish make using on-site sewage-disposal systems marginally effective at best. Poorly-drained soils filled with water do not have any space available for absorbing septic tank effluent. The effluent, therefore, either finds its way to area watercourses, or remains at or near the surface, resulting in an ill-smelling, unsanitary bog.

Generally, about 6 ft of well-drained soil is required for satisfactory septic tank operation. The only areas where this condition is found are along the northern bayou levee ridges. Elsewhere, the water table is too near the surface or the soils are too poorly-drained. For this reason, the areas in which satisfactory septic tank operation is possible are very limited, particularly south of Houma, and on-site treatment was therefore rejected as an alternative.

3.1.1.2 Collection and Transport System Selection. With the rejection of on-site treatment, collection and treatment of the sewage at one or more central locations became necessary. There were three basic alternatives for transport of the sewage: through gravity interceptors, entirely through force mains, or through a system of shorter force mains with holding

basins. Because of the extreme lack of topographic relief in the parish, a complete gravity system was determined to be infeasible. Likewise, the high water table and resulting soil conditions make it physically impractical and economically unsound to construct a system of long runs of gravity sewers connected by lift stations.

Comparison of capital and operating costs for various pumping alternatives determined that the most cost-effective system would be one using a series of flow-equalization holding basins connected by force mains. Considering the volumes of sewage generated in the proposed service areas, it was determined that it was most economical to transport sewage approximately seven miles with low-head pumps. Thus, the sewage transport system selected was a series of holding basins approximately seven miles apart, connected by low-head force mains.

3.1.1.3 Treatment Process Selection. The differences in the environmental considerations among the treatment process alternatives considered are minor, and have no bearing on the concerns of this EIS because the modified Negative Declaration already allows use of the processes selected. The process proposed for plants north of the GIWW was an activated bio-filter, while a pond-dissolved air flotation process is proposed for plants south of the GIWW. The selection of different processes is explained by the fact that effluent limitations differ according to the plant's location.

3.1.1.4 Number and Location of Treatment Plants. Having selected two treatment processes, one for plants south of the GIWW, in or near Water Quality Limited Segment 12G, and another for plants north of the GIWW, the number and location of treatment facilities was considered. Factors taken into

account included: availability of land; utilization of existing facilities; strength and volume of wastewater generated in a particular area; degree of treatment required at each site; capital, operating, and maintenance costs for plants, pumps, force mains and holding ponds; projected growth patterns; present and proposed land uses; and natural and man-made barriers, such as the GIWW and the numerous bayous.

Five basic options were considered in the location and number of treatment facilities. These options were based on treating a total flow of approximately 29 mgd.

Alt. #1. Two plants (the proposed project): a 12 mgd dissolved air flotation (DAF) plant at the site of the present City of Houma lagoons (the South plant), and a 16 mgd activated bio-filter (ABF) plant at the location of the present Sewerage District 12 and 13 lagoons (the North plant).

Alt. #2. Three plants: the South Plant, as above; a 1 mgd DAF plant in the Gibson area; and a 15 mgd ABF North Plant.

Alt. #3. Four plants: the South Plant, as above; a 1 mgd DAF plant at Gibson; a 2 mgd ABF plant at Schriever; and a 13 mgd ABF North Plant.

Alt. #4. Six plants: a 5.5 mgd DAF South Plant; a 5 mgd DAF plant at Dulac; a 3 mgd ABF plant at Sara; a 1 mgd DAF plant at Gibson; a 2 mgd ABF plant at Schriever; and a 13 mgd ABF North Plant.

Alt. #5. Five plants: the North, Gibson, Schriever, and Dulac plants as in Alt. #4, above, and an 8 mgd DAF South Plant.

Each of the five basic alternatives was also studied under a plan involving pumping 2.5 mgd from the parts of Houma north of the GIWW to the South Plant, thereby reducing the

size of the North Plant and increasing the size of the South Plant in each option by 2.5 mgd. Although treating all of the City of Houma's wastewater at one plant was desirable for administrative reasons, this plan was not cost-effective in any of the alternatives.

3.1.2 Environmental Evaluation of the Alternatives Considered by the Applicant

The only significant difference, other than cost, between the five options considered is that each additional treatment facility eliminates a holding basin and one 7-mile long major force-main. The Gravity System remains the same, as do all other components of the Holding Basin System. Thus, for each additional treatment plant proposed, the following trade-offs must be considered against the effects of constructing a 7-mile-long force-main:

a. A treatment plant requires more land than a holding basin. The two major plants will take about the same amount of land in all options, and that land is already publicly owned.

b. Two small treatment plants require more mechanical equipment maintenance expenses than one larger plant and a pump station in an aerated lagoon. The proposed plants use more (if not as large) pumps than the replaced holding basins, and also need various tankage, chlorinators, flowmeters, aerated holding ponds, and sludge handling equipment. The probability of equipment failure increases with increased equipment inventory; and more energy is required to run two small plants than one larger plant and a pump station.

c. More trained operators are required for multiple plants. The maintenance force for the Gravity and Holding Basin Systems and the staffing of the North and South plants will remain practically constant in all options.

d. The public acceptance of a mechanical treatment plant in the neighborhood is lower than that of the more natural appearance of a holding basin. A buried force main becomes "invisible" to the public eye after construction; a treatment plant is always visible.

e. It is a disadvantage to create additional discharge points, requiring additional permits, inspections, and records, to gain the difficult-to-quantify benefits, if any, of dividing the total effluent waste load, thereby presumably reducing impacts at the major discharge. All options treat the same total amount of waste to the same effluent limitations, so a beneficial lessening of the impacts at the major discharge becomes an increase in adverse impacts at the minor treatment plant.

f. In all the plant locations considered except Schriever, nearly the entire length of the major force main eliminated is closely paralleled by components of the Gravity System. If the force main is constructed at the same time as the gravity mains, as planned, the additional adverse effects of the force main will be limited to those not also arising from constructing the Gravity System. Noise and dust generation, wildlife disturbance, and traffic disruption will be nearly the same whether one pipeline or two are being built; the additional impacts will be the extra tree removal, erosion potential, and potential for leakage occasioned by the second pipe.

Considering the foregoing, the incremental differences in the effects (other than cost) of numerous plants versus those of a few plants are relatively insignificant, and favoring the smaller number of plants.

3.1.3 Economic Evaluation of the Alternatives Considered by Applicant

Table 15 presents the summarized cost data used in the cost-effective analysis, with the alternatives numbered in the same order as in Section 3.1.1.4, above. Note that the Step I engineering fee of $815,000 is included only in Alternative No. 1, and that none of the alternatives include the $60 million (plus) cost of the Gravity System, which is constant for all options. The figures in Table 15 represent estimated 1975 costs, and have not been updated to reflect changes in the project, such as the revised effluent criteria for the North Plant, the revised population and flow projections, or the closing of the Southdown Sugar mill. They are still useful for comparison purposes, however, since the changes apply equally to all alternatives.

The economic evaluation of the alternatives considered indicates that the overall concept of the Gravity and Holding Basin Systems collecting and transporting sewage to two large treatment plants (the selected project, Alternate 1) is the most cost-effective alternate among those considered

3.2 ALTERNATIVES CONSIDERED BY EPA

Three options are available to EPA in executing its construction grant program under Section 201 of the Federal Water Pollution Control Act Amendments of 1972: 1) issue a grant for the project as proposed; 2) issue a grant for an alternative project; and 3) deny the grant.

TABLE 15
COMPARISON OF 1975 COSTS OF TREATMENT AND COLLECTION ALTERNATIVES

	ALT. #1**	ALT. #2	ALT. #3	ALT. #4	ALT. #5
A. Treatment Plant Cost					
1) South Plant*	$ 6,327,000	$ 5,814,000	$ 5,814,000	$ 1,890,000	$ 3,177,000
2) North Plant	7,072,000	7,231,000	6,533,000	6,533,000	6,533,000
3) Gibson Plant		1,082,000	1,082,000	1,082,000	1,082,000
4) Schriever Plant			1,943,000	1,943,000	1,943,000
5) Dulac Plant				5,829,000	5,829,000
6) Sara Plant				4,080,000	
Sub-Total	$13,399,000	$14,127,000	$15,372,000	$21,357,000	$18,564,000
B. Major Collection Cost					
1) City Facilities	$ 2,331,000	$ 2,331,000	$ 2,331,000	$ 2,331,000	$ 2,331,000
2) S.D. # 12 & 13 Facilities	639,000	639,000	639,000	639,000	639,000
3) Parish Facilities	9,800,000	9,240,000	8,647,000	7,103,000	8,198,000
Sub-Total	$12,770,000	$12,210,000	$11,617,000	$10,073,000	$11,168,000
C. Telemetering	$ 375,000	$ 375,000	$ 375,000	$ 375,000	$ 375,000
D. Rehabilitation	3,559,000	3,559,000	3,559,000	3,559,000	3,559,000
Sub-Total	$ 3,934,000	$ 3,934,000	$ 3,934,000	$ 3,934,000	$ 3,934,000
E. Contingencies	$ 3,034,000	$ 3,150,000	$ 3,226,000	$ 3,722,000	$ 3,528,000
TOTAL CONSTRUCTION COST	$33,137,000	$33,421,000	$34,149,000	$39,086,000	$37,194,000

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TABLE 15 (Contd.)

		ALT. #1**	ALT. #2	ALT. #3	ALT. #4	ALT. #5
F.	Engineering	$ 3,100,000	$ 2,771,000	$ 2,839,000	$ 3,276,000	$ 3,104,000
G.	Project Representative	1,015,000	693,000	710,000	818,000	776,000
H.	Legal & Admin.	100,000	193,000	188,000	177,000	186,000
I.	Right-of-Way Cost	295,000	292,000	292,000	267,000	286,000
J.	Land Cost	102,000	174,000	189,000	189,000	499,000
	Sub-Total	$ 4,612,000	$ 4,613,000	$ 4,218,000	$ 4,727,000	$ 4,851,000
K.	P.W. Pump O.&M.	$ 3,713,000	$ 3,023,000	$ 3,511,000	$ 2,826,000	$ 3,027,000
L.	P.W. Aerator O.&M.	379,000	396,000	399,000	399,000	418,000
M.	P.W. Treatment Plant O.&M.	6,919,000	7,115,000	7,112,000	9,625,000	8,345,000
	Sub-Total	$11,011,000	$10,534,000	$11,022,000	$12,850,000	$11,790,000
	GRAND TOTAL	$48,760,000	$48,118,000	$49,389,000	$56,663,000	$53,835,000

* Includes Isle DeJean Charles package treatment plant cost.
** Includes Step I Engineering ($815,000). All other Alternatives shown on this Table do not include this fee.

Source: Taken from Table C.2-23, p. C-302 of the Facility Plan.

3.2.1 Issue a Grant for the Proposed Project

If EPA issues a grant for the project as presently proposed, the impacts described in Chapter 5 will occur. The overall net environmental effects of this alternative will be beneficial.

3.2.2 Issue a Grant for an Alternative Project

EPA may modify the proposed project if the modifications are more cost effective or there are environmental consequences that make the modified plan the most beneficial in the overall public interest.

An alternative was investigated that approached the area's water quality problems on a scale less than parish-wide. This plan would collect and treat a substantial majority of the wastewaters from the heavily-developed areas, and would not include the Holding Basin System or the bulk of the Gravity System. The benefits to the natural environment would be about the same as those of the proposed project, at a reduced cost.

This alternative would consist of constructing a plant to serve the Schriever and Gray service areas, another for the Boudreaux and Dulac service areas, upgrading the North and South plants to serve only the existing and future populations of their present service areas, and upgrading the remaining existing private and public plants to serve their present service areas. Nearly all the seafood industry's wastes, all the sewage from the present and future populations of presently-sewered areas, and the sewage from about half of the total present and future populations of presently-unsewered areas would be collected and treated by this plan. It would account for about 21 mgd of the 26 mgd total design flow of the proposed project. The remaining sewage, contributed by about 24,000 persons now, and 40,000 by 1995, would be widely dispersed

throughout the parish and most of it would receive partial treatment in septic tanks. The wetlands degradation resulting from this proposal in 1995 would be considerably less than that occuring now, but the serious public health hazards within the parish outside of Houma would still exist.

The major benefit of this proposal would be economic. Although sufficient information to make accurate cost estimates for upgrading the small private and public systems is not available, it would appear that this alternate project could reduce the total capital cost from over $100 million to less than $70 million. Also, the projected annual O&M expenses would be lowered by about two-thirds. Other benefits include avoiding nearly all of the adverse impacts of constructing and operating the extensive Holding Basin and Gravity Systems.

As a result of this evaluation, this alternative was rejected as not viable in the overall public interest since certain threats to public health within the parish outside of Houma would remain a problem.

3.2.3 Deny the Grant - No Action

Should the EPA elect to deny the grant, it would be equivalent to taking no action on the proposed project. Under this "no-action alternative", all work covered by the negative declaration, much of which is already underway, will continue. This includes construction of the proposed North and South

Plants to capacities of 12 and 10 mgd, respectively, and the rehabilitation of existing sewer lines inside the City of Houma and Sewerage Districts 12 and 13.

With respect to the remaining proposed regional sewerage facilities, a number of actions will occur as a result of the requirements of Public Law 92-500. Rather than simply maintaining the status quo, adopting the no-action alternative will have the following results:

a) Besides upgrading the North and South plants as allowed by the negative declaration, each of the remaining five publicly-owned and 66 privately-owned treatment facilities will also eventually have to be upgraded to meet the effluent limitations applicable to its area.

b) The existing population in unsewered areas will continue to discharge untreated or partially-treated sewage to surface waters. Future developments in unsewered areas will either use septic tanks, or be required to construct and maintain additional small private treatment facilities capable of meeting the applicable effluent limitations.

3.2.3.1 Socioeconomic Effects

a) Capital Costs. The cost of upgrading the seven publicly-owned (including the North and South plants) and numerous privately-owned treatment facilities will be much greater than that of constructing the two plants proposed in the regional sewerage plan.

However, a sizeable savings of local and federal funds will result from not building the proposed Gravity and Holding Basin Systems. The net local savings should be on the order of $8 million. If the costs of upgrading the private systems are borne by private parties, nearly all of the $39.9 million federal share of the Gravity System could be utilized on other federal projects.

b. Operating and Maintenance Costs. The O&M costs associated with many small plants will greatly exceed those of the proposed treatment plants and the Holding Basin System, although this will be balanced to some extent by elimination of O&M costs on the proposed Gravity System. It is not known whether the overall O&M costs of the proposed system will be greater or less than those of the no-action alternative.

c. Sunk Costs. The presently-approved capacities of the North and South plants include allowances for sewage generated by the existing population of the currently unsewered areas. Therefore, under the no-action alternative, the two plants will have significant excess capacity, and could represent an excess expenditure. Also, less benefits will be received from the estimated $1 million spent to date for the present sewerage plan, legal fees, and other project-related expenses.

d) Secondary Economic Impacts.

1) The inability to receive FHA loans in unsewered areas will increase the present pressure for housing in the sewered areas of the parish, and may lead to an inordinate disparity in real estate values between sewered and unsewered areas.

2) The no-action alternative will make it necessary for the various seafood packers to install individual sewage treatment facilities. Some of the smaller industries, unable to raise the necesary capital, might be forced out of business. Similarly, small sewerage districts and private subdivision treatment plants, lacking capital to upgrade, may be forced to

abandon their operations and pump to the nearest larger facility, thereby creating systems similar to the proposed project, but less efficient.

4) Under the no-action alternative, there will be minor water quality improvements, but it is unlikely that the currently-closed oyster beds could be reopened.

e) Public Acceptance. Since the existing parish-wide sewerage facilities bond issue was passed for parish-wide sewage collection and treatment, considerable dissatisfaction could be generated by adopting the no-action alternative. However, it should be noted that a portion of the public could be in favor of the no-action plan.

f) Land Use and Population. The land required for upgrading the various treatment facilities throughout the parish will probably equal or exceed the additional thirty acres required for the total proposed project. Because most of the existing facilities border wetlands, more wetlands will probably be developed under the no-action alternative than under the proposed project. No land-use restrictions will be imposed by sewer easements under the no-action alternative.

The parish population will continue to grow. Without regional sewerage facilities, the population has grown by 12.8 percent in the past 7 years, and there is no reason to believe the rate will drop significantly in the next two decades.

Most future development will occur north of the GIWW, with or without the proposed sewerage facilities, because of the limited transportation access across the GIWW and

between the bayous, the threat of tidal flooding, and the restricted amount of dry land of sufficient elevation south of the GIWW.

3.2.3.2 Biological Effects

a) Oysters. Under the no-action alternative, continued population growth in the unsewered areas, which are closest to the oyster beds, will probably negate the minor water quality improvements and prevent the re-opening of the oyster beds, and possibly result in even more being closed.

b) Shrimp. The direct effects of sewage treatment, or a lack thereof, on shrimp production are expected to be minimal. A small loss of wetland habitat associated with upgrading the existing treatment plants will result in a very minor adverse impact on the parish shrimp resources.

c) Higher Vertebrates. Higher vertebrates include finfish, reptiles, amphibians, birds, and mammals. The continued and increasing discharge of raw sewage from the areas remaining unsewered under the no-action alternative must reasonably be expected to have some net adverse impacts on these populations by degrading aquatic food chains and increasing the number of pathogens. However, since these discharges are quite small and widely dispersed, dilution of the wastes should prevent any severe impacts. Further adverse impacts will be caused by the small loss of habitat resulting from the additional construction required to upgrade the existing treatment facilities.

d) Vegetation. The primary impacts on vegetation under the no-action alternative will result from taking additional land adjacent to the existing sewage treatment facilities. There is no accurate estimate of the amount of land required, but it is not expected to exceed 100 acres parish-wide. A

good portion of this land has already been altered by development, although some of it will be wetlands. Since the major force mains would not be built, overall impacts would be less than those of the proposed project.

3.2.3.3 Physical Effects

a) Air and Noise Quality. Adoption of the no-action alternative would have very minor adverse effects on air and noise quality, due to construction and operating activities at the numerous treatment plants. Similarily, air and noise impacts caused by traffic disruption will be extremely minor under the no-action alternative.

b) Archaeological-Historical. Construction activities associated with the no-action alternative are unlikely to disturb historical or archaeological sites because all work will be immediately adjacent to already-developed areas.

c) Water Quality and Public Health. The most obvious adverse impact of adopting the no-action alternative would be that much of the present pollution would be allowed to continue. Rehabilitating the existing sewer systems, upgrading the two major treatment plants, upgrading the remaining public, private and industrial treatment plants, and providing treatment for presently untreated industrial wastes will solve a large part of the present water pollution problem. However, the pollution caused by the unsewered residences will continue, and will worsen as the population increases in those unsewered areas.

The following illustrates the order of magnitude of the pollution involved:

Typical raw domestic sewage of median strength contains 200 mg/l BOD_5, 200 mg/l SS, and a total coliform count of 30×10^6/100 ml (Ref 33). A typical septic tank (not

counting the leach field) removes approximately 50 percent of the BOD_5, 75 percent of the SS, and none of the coliforms (Reference 5). Assume an average flow of 60 gpcd, similar to those of Sewerage Districts 16 and 17. Further assume that all the unsewered population uses septic tanks, and that, because of the high water table, only the treatment efficiencies of the tanks themselves can be considered.

Based on the above assumptions, an unsewered population of 42,000 would discharge 2.52 mgd of partially-treated sewage into the surrounding wetlands and surface waters. This daily discharge will contain almost 2,100 lb. of BOD_5, 1,050 lb SS, and 2.9×10^{15} total coliform colonies. If these same 42,000 people were connected to the proposed South Treatment Plant, the increased treatment efficiency would reduce the pollutants in their daily discharge to approximately 105 lb. BOD_5, 315 lb SS, and 6.7×10^{9} total coliform colonies.

It is practically impossible to determine the relative merits of two high-volume discharge points versus some seventy-odd smaller discharges plus a myriad of septic tanks scattered throughout the parish. Since the total parish waste load is the same, the benefits derived from reducing the quantity of pollutants discharged at one point entail the corollary adverse effects of increasing the pollutants discharged at another point. While numerous discharges would probably allow better assimilation of the wastes, and therefore a net benefit, this assumes an equal degree of treatment. With a large number of septic tanks among the discharges, the net benefit becomes doubtful.

The reduced level of treatment provided by septic tanks for the unsewered residences under the no-action alternative would produce adverse impacts on public health and sanitation.

3.3 ALTERNATIVES AVAILABLE TO THE U.S. ARMY CORPS OF ENGINEERS

For parts of the project where construction of the sewerage system will take place in navigable waters or wetland areas, permits must be obtained from the Corps of Engineers.

Proposed project activities requiring Section 404 permits include constructing those holding basins, pump stations, and force-mains located in wetlands. Section 10 permits will be required for all construction in the navigable waters of the parish. This construction will primarily consist of various sewerage force mains crossing the navigable bayous.

3.3.1 Issue the Permits. If the Corps of Engineers issues the Section 404 permits for the project as proposed, some wetland areas will be filled for constructing the holding basins. The amount of wetland to be filled is not known precisely, but will be less than 15 acres in total.

If the Section 10 permits are issued, constructing force-mains across the bayous and other navigable waterways will temporarily disrupt navigation, temporarily cause increased turbidity in the waters, and destroy immobile organisms directly in the construction area. These effects are not considered severe because turbidity in the bayous is already significant, and the increase will be small and short-lived. The number of organisms destroyed will be extremely small in relation to the total numbers in similar areas, and the area will be available for repopulation shortly after construction.

3.3.2 Issue Conditioned Permits. The Corps of Engineers could issue conditional permits with the stipulation that more siltation control measures be used. Such a provision will help prevent the temporary increases in turbidity resulting

from construction activities, but cause some increase in construction costs.

3.3.3 Deny the Permits. The Corps of Engineers can deny Section 10 applications for permits to place sewer lines in navigable waters. Should this occur, the sewer lines will have to be located on existing crossings over the waterways. This will result in significant additional sewer-line length to reach existing crossings. The environmental benefits of such an action will be negligible because of the large number of subaqueous crossings already in place.

The Corps of Engineers can also deny applications for Section 404 permits for construction in wetlands. This will prevent the loss of the wetlands to be taken by the holding basins, and will necessitate locating the basins on dry land, probably nearer to existing developments. Land-acquisition costs and force-main lengths and costs would probably be increased as a result of this action.

4. DESCRIPTION OF THE PROPOSED PROJECT

4.1 SUMMARY DESCRIPTION

The parts of the overall proposed project subject to consideration in this EIS are:

a. Expanding the North Treatment Plant from its presently-designed 12 mgd capacity to a capacity of 16 mgd for the design year 2000.

b. Expanding the South Treatment Plant from its presently-designed 10 mgd capacity to 13 mgd for the design year 2000.

c. Constructing the Holding Basin System, including 29 holding basins with water surface areas ranging from 0.25 to 2.5 acres, two major pumping stations, and some 678,000 ft of major force mains, ranging from 4 to 16 inches in diameter. All holding basins will be equipped with submersible pumps. Seven of the holding basins will use existing, larger oxidation lagoons; the remaining 22 new basins will be equipped with floating aerators to prevent the sewage from becoming septic and causing odors. A telemetry system will be installed, consisting of high-water-level detectors in the basins and major pump station wetwells which will send alarm signals to a control panel at the North Plant via telephone wires.

d. Constructing the Gravity System, including some 336 minor pump stations, 103 grinder pump stations, 823,350 ft of minor force mains, and about 1,406,625 ft of gravity collection sewers ranging from 8 to 18 inches in diameter.

e. Constructing a package wastewater treatment plant at Isle de Jean Charles.

The project's basic operating scheme is that sewage will be collected from individual homes, businesses, and

industries, and transported to a holding basin by the Gravity System. The holding basins will function as flow equalization ponds, and are designed to retain a volume above their normal 4-ft operating depth equivalent to four hours' peak flow from their individual service areas, while still maintaining a 2-ft freeboard. Submersible pumps in each basin will continuously pump the average flow from both the basin's service area and from any tributary outlying basins to the next holding basin. This process will be repeated from basin to basin until the sewage reaches a treatment plant.

The layout of the proposed project is shown in the Technical Support Document. A schematic of the Holding Basin System only is presented in Figure 14. The locations indicated on these drawings are illustrative only. The various sewers are in public rights-of-way and along the banks of canals and bayous unless clearly indicated otherwise.

4.2 TREATMENT FACILITIES

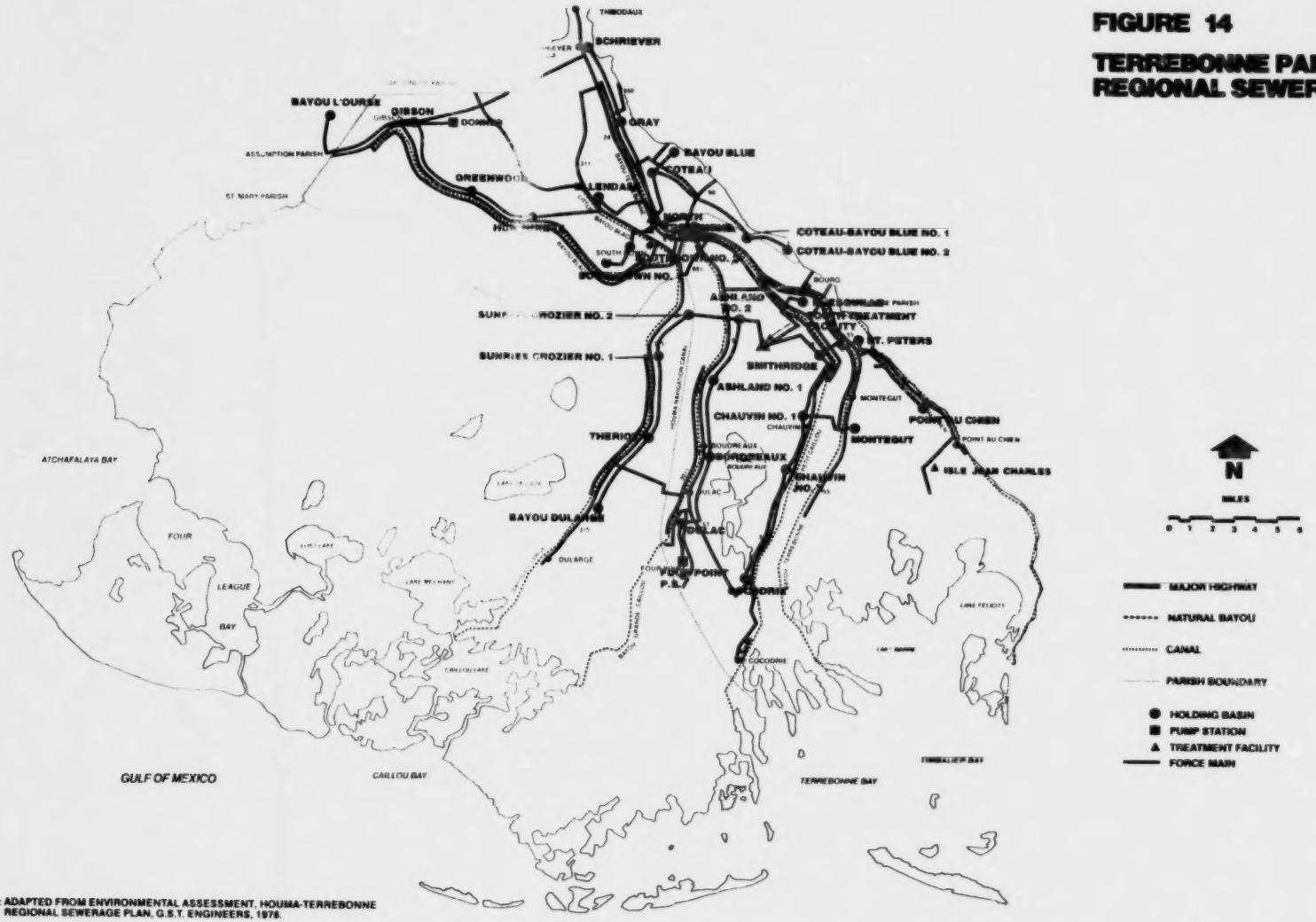
4.2.1 North Plant

The North Plant will be built at the site of the existing Sewerage District 12 and 13 oxidation lagoons, on property presently owned by the parish. Although this site contains a "perched" wetland, the Corps of Engineers has determined that a Section 404 Permit is not required. The plant will use the activated bio-filter (ABF) process.

4.2.1.1 Functional Description. Plant influent will pass through bar screens, comminutors, and a Parshall flume. Excess flow will be diverted to the existing 8-acre Sewerage District 12 lagoon, which will serve as a flow equalization basin. From the Parshall flume, wastewater will pass through grit removal; primary clarification; a wetwell, from which it

FIGURE 14

TERREBONNE PARISH PROPOSED REGIONAL SEWERAGE PLAN



SOURCE: ADAPTED FROM ENVIRONMENTAL ASSESSMENT, HOUMA-TERREBONNE REGIONAL SEWERAGE PLAN, G.S.T. ENGINEERS, 1978.

will be pumped to the ABF units; a mechanically-aerated pond, secondary clarification; and chlorine contact chambers, before being discharged to the St. Louis Canal. ABF effluent can also be recirculated to the wetwall to maintain biological growth in the ABF units during periods of low flow. Grit will go to three sludge and grit disposal ponds created by partitioning the existing 14-acre Sewerage District 13 lagoon. Primary clarifier sludge and scum will be pumped to anaerobic sludge digesters. Sludge from the secondary clarifiers will either be recirculated to the primary clarifiers or pumped to the anaerobic digesters. Digested sludge will go to the three sludge disposal ponds, and digester supernatant will be returned to the primary clarifiers. When the sludge ponds become full, the sludge will be hauled to an unspecified landfill.

4.2.1.2 Treatment Quality. The North Plant's effluent is expected to be continuously within the limitations of 7 mg/l BOD_5, 15 mg/l SS, and 200 fecal coliforms/100 ml.

4.2.1.3 Expansion. The treatment units have been designed for the 12 mgd plant authorized by the Negative Declaration, and will be expanded to 16 mgd.

4.2.2 South Plant

The South Plant will be built on 20 acres presently owned by the City of Houma immediately west of the existing 270-acre City lagoons. Part of this site is a wetland, and a Corps of Engineers Section 404 permit has been issued to allow construction of the plant. The plant will be a three-pond process, preceded by an aeration lagoon to reduce the heavy organic loading expected during the commercial fishing season, and followed by dissolved-air flotation (DAF) units for algae removal.

4.2.2.1 Functional Description. The northwest cell of the existing oxidation pond will be partitioned into a 26-acre aeration lagoon, a 56-acre anaerobic pond, and two 6-acre sludge holding ponds. Plant influent will be sequentially directed to the aeration lagoon, where it will be mechanically aerated by eight 30-hp aerators; the anaerobic lagoon; the existing 81-acre northeast cell, which will become a facultative lagoon; the existing 108-acre south cell, which will become a polishing lagoon; and then to the DAF system. Following the DAF process, the wastewater will be chlorinated and discharged to the St. Louis Canal. Sludge generated in the DAF process will be sent to the holding ponds. Holding pond supernatant will be pumped to the aeration pond, and final sludge disposal will be to an unspecified landfill.

4.2.2.2 Treatment Quality. The South Treatment Plant's effluent is expected to be continuously within the limitations of 5 mg/l BOD_5, 15 mg/l SS, and 70 total coliforms/100 ml. The process described above is expected to meet these limitations; however, the addition of filtration units following the DAF process will be implemented in the event that effluent quality cannot be maintained. (Costs for the additional filtration units are not included in the project cost estimates.)

4.2.2.3 Expansion. The treatment units have been designed for the authorized 10 mgd capacity. The plant will be expanded by adding parallel DAF units.

4.2.3 Isle de Jean Charles Package Plant

This plant will be located on the north end of Isle de Jean Charles, near the access road. Effluent limitations for that area are 5 mg/l BOD_5, 15 mg/l SS, and 70 total coliforms/100 ml.

4.3 GRAVITY AND HOLDING BASIN SYSTEMS

4.3.1 Holding Basin System

Details of the individual holding basins are given in Table 16. The following is an explanation of the column headings used in Table 16:

Basin: The commonly-used local name for the basin site.

Pop: The projected 1995 population of the basin's service area (from Table C.2-7 of the Facility Plan, revised).

Q_A The average 1995 flow from the basin's service area, in gpm (from Table C.2-12 of the Facility Plan, revised).

WSA: The required water surface area of the basin, in acres (from Table C.2-12 of the Facility Plan, revised).

TA: The total area required for the basin site, in acres (calculated in accordance with Appendix S of the Facility Plan).

Q_D: The total 1995 flow to be pumped from the basin, including flow received from outlying basins, in gpm (calculated in accordance with diagram C.2-1 of the Facility Plan).

FM: The length of the major force main to the next basin, in feet, followed by its diameter in inches (from Table C.2-17 of the Facility Plan, revised).

4.3.2 Gravity System

The proposed project includes 103 grinder pump stations, 336 minor pump stations, 823,350 ft (156 mi) of minor force main, and 1,406,625 ft (266 mi) of gravity sewers.

TABLE 16
HOLDING BASIN DETAILS*

Basin Contributing to North Plant:	Pop.	Q_A	WSA	TA	Q_D	FM
1. Bayou L'Ourse	655	57	0.25	0.8	57	37,600-6
2. Donner/Chacahoula Major Pump Station	961	83	-	-	83	9,600-6
3. Gibson	1,810	157	0.25	0.8	297	30,650-10
4. Greenwood	912	79	0.25	0.8	376	26,930-10
5. Humphreys	1,420	123	0.25	0.8	499	28,770-10
6. Ellendale +	1,015	88	0.25	0.8	587	24,100-10
7. Southdown No. 1 +	593	51	0.25	0.8	51	11,700-8
8. Southdown No. 2 + #	2,927	1,712	2.00	3.2	1,763	22,100-14
9. Schriever	6,856	595	0.75	1.6	595	18,600-10
10. Gray	4,148	360	0.50	1.2	955	31,900-14
11. Bayou Blue	1,450	126	0.25	0.8	126	9,340-8
12. E. Coteau-Bayou Blue No. 2	431	37	0.25	0.8	37	18,725-6
13. E. Coteau-Bayou Blue No. 1 +	2,178	189	0.25	0.8	226	25,270-8
14. Upper Coteau	2,649	230	0.50	1.2	582	13,320-10

* See preceding page for explanation of column headings and codes.

\# Flow includes industrial/commercial hydraulic population equivalent.

\+ Uses an existing lagoon - no new land required.

Table 16 Continued

Basin	Pop.	Q_A	WSA	TA	Q_D	FM
Contributing to South Plant:						
15. Bayou du Large	1,252	109	0.25	0.8	109	30,350-6
16. Theriot	1,164	101	0.25	0.8	210	28,030-8
17. Sunrise-Crozier No. 1	790	69	0.25	0.8	279	18,480-8
18. Sunrise-Crozier No. 2 +	828	72	0.25	0.8	351	15,000-8
19. Four-Point Major Pump Station	110	9	-	-	9	17,510-4
20. Dulac #	1,233	454	0.75	1.6	463	18,100-8
21. Boudreaux #	5,298	2,125	2.50	3.8	2,588	26,500-16
22. Ashland No. 1	715	62	0.25	0.8	2,650	24,500-16
23. Ashland No. 2	385	33	0.25	0.8	3,034	9,000-14
24. Cocodrie	357	31	0.25	0.8	31	24,100-4
25. Chauvin No. 2 #	238	90	0.25	0.8	121	30,800-8
26. Montegut	1,980	172	0.25	0.8	172	13,500-6
27. Chauvin No. 1 #	5,452	681	0.75	1.6	974	30,410-12
28. Point-au-Chien	1,213	105	0.25	0.8	105	26,710-6
29. St. Peters	1,876	163	0.25	0.8	268	16,100-8
30. Smith Ridge +	3,428	298	0.50	1.2	1,540	21,000-14
31. Presquille +	2,732	237	0.50	1.2	237	19,500-8

Nearly all will be located in publicly-owned rights-of-way. Table 17 shows the sewer lengths and sizes in each holding basin service area. The above totals include some facilities that are in the City of Houma or the Sewerage District 12 and 13 service areas and are, therefore, included in the work under the Negative Declaration.

4.4 OPERATION AND MAINTENANCE CONSIDERATIONS

The Terrebonne Parish Department of Public Works is presently preparing operations and maintenance (O&M) and staffing plans, following EPA guidelines.

4.5 PROJECT COSTS

The two treatment plants and the Holding Basin System are estimated to cost a total of $38,850,000 (1976 cost figures), of which $27,700,000 would be furnished by the EPA's construction grants program, and $11,150,000 would come from general obligation bonds issued by the parish. The parish has already sold $8,000,000 in bonds, and will need a supplemental bond issue to provide the remaining funds required.

The gravity collection system is estimated to cost $60,767,000 (1978 cost figures), of which $39,901,000 was the federal share. The remaining local cost of $20,866,000 is to be funded by the special assessment process, wherein each property owner served by the new system is assessed at a set rate per front foot to pay for constructing the part of the system fronting his property. The special assessment districts will coincide with the proposed holding basin service areas, with construction proceeding in a concentric-ring pattern outward from Houma.

O&M costs for the Gravity System are estimated on a per-minor-lift-station basis by dividing the City of Houma's

TABLE 17
GRAVITY COLLECTION DETAILS

Service Area	Lin Ft Gravity Sewers					Lin Ft Minor Force Main (All Sizes)	Acres Affected by Sewer Construction	Minor Pump Sta.	Acres Taken for Pump Station Sites	Grinder Pump Stations
	8"	10"	12"	15"	18"					
1. Cocodrie	25,100	7,800	4,200	-	-	44,900	7.53	10	.14	32
2. Boudreaux	50,925	3,800	4,000	4,200	350	27,800	8.36	15	.21	0
3. Dulac	16,200	3,000	2,100	1,200	-	8,800	2.87	6	.08	0
4. Chauvin #1	73,600	7,100	4,200	3,600	3,000	43,700	12.42	20	.28	0
5. Chauvin #2	9,100	1,200	-	-	-	11,400	1.99	4	.06	0
6. Point-au-Chien	22,000	7,200	3,100	2,100	-	32,350	6.13	9	.13	5
7. Montegut	49,800	3,000	4,800	-	-	40,500	9.01	11	.15	3
8. St. Peters	33,850	2,700	1,650	4,700	-	27,600	6.47	12	.17	0
9. Smith Ridge	57,800	10,800	7,400	-	-	35,600	10.25	21	.29	0
10. Bayou du Large	19,500	4,800	2,100	-	-	27,650	4.96	9	.13	9
11. Theriot	27,400	15,400	5,700	-	-	30,500	7.25	12	.17	4
12. East Coteau-Bayou Blue #1	17,000	3,300	-	-	-	8,600	2.65	4	.06	0
13. East Coteau-Bayou Blue #2	13,900	7,200	-	-	-	15,600	3.37	6	.08	12
14. Sunrise-Crozier #1	18,600	1,800	4,500	-	-	13,100	3.68	6	.08	4
15. Sunrise-Crozier #2	19,200	2,100	-	-	-	18,000	3.61	4	.06	0
16. Gray	49,900	15,000	7,700	5,100	-	32,700	10.14	19	.27	0
17. Schriever	110,700	10,500	5,500	3,900	-	59,700	17.47	25	.35	0

Table 17 Continued

Service Area	Lin Ft Gravity Sewers					Lin Ft Minor Force Main (All Sizes)	Acres Affected by Sewer Construction	Minor Pump Sta.	Acres Taken for Pump Station Sites	Grinder Pump Stations
	8"	10"	12"	15"	18"					
18. Bayou Blue	36,800	6,300	6,900	-	-	33,650	7.68	12	.17	9
19. Coteau	32,800	8,100	2,300	-	-	14,400	5.29	11	.15	0
20. Humphreys	36,400	9,900	7,800	1,200	-	28,800	7.72	14	.20	0
21. Greenwood	20,600	9,000	8,000	-	-	13,700	4.71	7	.10	10
22. Gibson	45,100	9,200	3,100	3,300	-	39,700	9.22	14	.20	3
23. Chacahoula	21,700	9,100	1,800	-	-	26,200	5.40	8	.11	0
24. Ellendale	14,900	-	-	-	-	21,800	3.37	4	.06	0
25. Southdown #1	16,300	5,050	1,800	-	-	14,400	3.45	5	.07	5
26. Southdown #2	12,000	900	-	-	-	8,200	1.94	3	.04	0
27. Presquille	57,850	13,900	2,400	1,900	-	44,100	11.03	19	.27	0
28. Ashland #2	20,000	3,000	-	-	-	17,900	3.76	4	.06	0
29. Ashland #1	11,900	1,900	-	-	-	5,200	1.74	4	.06	0
30. Bayou L'Ourse	15,400	4,200	1,500	-	-	16,950	3.49	5	.07	7
31. Four Point	6,800	-	-	-	-	4,600	1.05	1	.01	0
32. Isle Jean Charles	7,200	-	-	-	-	3,300	0.96	3	.04	0
SUB TOTAL	970,325	187,250	92,550	33,300	3,350	771,400	188.97	307	4.32	103
33. City of Houma	53,300	1,600	2,600	-	-	24,350	7.52	13	.18	0
34. North Plant Ser. Area	51,050	6,900	4,400	-	-	27,600	8.26	16	.22	0
TOTAL PROJECT	1,074,675	195,750	99,550	33,300	3,350	823,350	204.75	336	4.72	103

Compiled From the Environmental Assessment Supplement, January 1977; & Table C-1 (Revised), June, 1978.

1977 sewerage department expenditures by the number of lift stations in the City, which comes to $5,550 per minor lift station. On this basis, the annual O&M cost for the Gravity System alone would be $1,864,800, not including O&M on present collection facilities.

The combined O&M costs for the treatment plants and the Holding Basin System are estimated to average about $1,225,000 per year (1975 cost figures). This, together with the estimated Gravity System O&M costs, above, and the $333,000 per year to maintain the existing sewers (both 1977 costs), gives an estimated total annual O&M cost for the entire sewerage system of at least $3,422,800. These costs do not include any anticipated increases in power and labor rates.

4.6 CONSTRUCTION SCHEDULE

The original construction schedule (Reference 33) called for completion of sewer system rehabilitation and construction of the two treatment plants by November, 1979, based on approval of the I/I study by June 15, 1976, and of the Facility Plan by July 15, 1976; or a total elapsed time of about 3½ years. Work was scheduled in five sections, some of which were to have run concurrently. Each of the five sections was subdivided into staggered subsections. No new schedule has been submitted, but the work will presumably still be scheduled for completion within 3½ years of approval. Work allowed by the modified Negative Declaration is proceeding.

Construction of the holding basins, major force mains, and the Gravity System is not scheduled. Each holding basin and its accompanying major force main is proposed to be constructed concurrently with the gravity collection system in its service area. Construction phasing in the various Gravity

System service areas is to depend on the degree of local interest, with those areas expressing the greatest support for the project being built first. Support is foreseen as first coming from the more densely-populated areas close to Houma, thereby resulting in the concentric-ring pattern mentioned in Section 4.5. The seafood processing concerns along Bayou Grand Caillou are also expected to show considerable interest, thereby speeding construction of the system in that direction. However, specific planning for phasing this largest part of the cost of the overall project has not been undertaken to date. Unofficial estimates of the completion date range from 5 to 10 years from approval of the entire project, depending upon public support.

5. IMPACTS OF THE PROPOSED PROJECT

This Chapter addresses the impacts resulting from constructing and operating the Holding Basin and Gravity Systems, and from expanding the North and South Plants from 12 mgd and 10 mgd to 16 mgd and 13 mgd, respectively. Measures to mitigate the adverse impacts will also be discussed.

5.1 GEOLOGIC IMPACTS

5.1.1 Subsidence

The extra weight of the holding basin levees and pump stations may lead to subsidence in limited areas around such structures. Besides adding to the potential for levee failure and pipeline breakage (see Sec. 5.2, below), this localized settlement could require periodic raising of the levees (thereby increasing O&M costs) and cause minor localized changes of dry ground to wetland, or of wetland to open water, with accompanying changes in the local flora and fauna. These effects are deemed permanent adverse impacts of the proposed project. The general, region-wide subsidence caused by compaction of deltaic sediment is not expected to cause breakage problems for the proposed facilities.

5.1.2 Soils

Most of the soils excavated for the pipelines can be used for backfill, and some soils excavated for the holding basins can be used for levee construction. The marsh- and swamp-area soils, however, have poor strength and stability, high shrink-swell properties, and low bearing capacity and are, therefore, unsuited for embankments and undesirable for pipeline bedding. Thus, it will be necessary to import suit-

able materials, such as the Mhoon, Sharkey, or Commerce Association soils found in the bayou banks to construct those holding basins located in swampy areas and to replace unsuitable pipe bedding and backfill materials. It will also be necessary to dispose of the unsuitable soils in non-wetland areas. Besides the energy consumed in hauling these materials, their use in this project precludes other uses and, therefore, represents an irretrievable and irreversible commitment of resources. Local availability of stable soils is quite limited, making this a moderate economic impact. Shells are commonly used for pipe bedding, are readily available, and may be used to reduce the soil requirements in many cases.

Some small amount of soil will be lost by erosion from exposed earth on trenchlines and other construction areas. This impact will be rather minor because of the flat terrain.

The proposed project should have no impact on the economic geology of the parish. The proposed facilities will in no way hinder the extraction of mineral deposits.

5.1.3 Alteration of Land Forms

Constructing the pump stations, treatment plant expansions, and holding basins will locally alter the existing land profiles, presenting visual obstructions that may be objectionable to some people. This is deemed a relatively minor, and unavoidable, adverse effect.

5.2 IMPACTS ON HYDROLOGY

5.2.1 Temporary Impacts During Construction

5.2.1.1 Temporary Lowering of Water Quality. Some erosion will occur from trenches and plant sites, causing localized

worst cases are undetected force main breaks and emptying of holding basin contents by a hurricane or levee break. In either case, less sewage than is presently being discharged to area waterways would be escaping. In the latter case, the sewage will have been aerated, and will be diluted by the rain and flooding accompanying the hurricane. Therefore, either of these events will have less total environmental impact than does the total of the present numerous discharges of untreated and partially-treated sewage, and the impacts will be of much shorter duration.

5.2.2.2 Water Quality Improvement. Even allowing for the short-term construction impacts and the temporary, infrequent, localized effects of the system failures discussed above, the overall long-term effect of the proposed project will be an improvement in the quality of the parish's surface waters. The significantly higher degree of treatment afforded by the upgraded plants will cause improvement even in the immediate areas around the plants' discharge points, in spite of the greater wastewater volumes discharged. The total oxygen demand and suspended solids loadings will be lower, and coliform bacteria should be virtually eliminated. Further, the pollutants remaining after treatment will affect only relatively small areas near the plants, as opposed to the parish-wide degradation that presently exists.

Having only two plants will facilitate increasing the degree of treatment, should such ever be required or desirable, by limiting the scope of planning and implementation necessary.

Even though the proposed project will improve the area's water quality, it must be evaluated in light of the area's difficult hydrology (i.e., the major problems of saltwater intrusion, agricultural and urban runoff, and resuspension of

siltation and turbidity. The dredging required for bayou and wetlands crossings will also disturb bottom sediments, causing turbidity and dissolved oxygen (D.O.) depletion, and may also temporarily allow some minor amount of saltwater intrusion before the trenchline is restored to its original contours. Considering the high amount of turbidity already present, the short period of D.O. depletion (and lack of organisms in the construction area to require D.O., once dredging starts), and the very low amount of saltwater intrusion allowed, these impacts are deemed very minor.

5.2.1.2 Dewatering. Trench dewatering to allow proper pipe installation will temporarily lower very localized areas of the water table. The extent and duration of this aspect of construction will be so limited that no impacts are expected beyond the energy expenditure necessary to accomplish it.

5.2.2 Impacts of System Operation

5.2.2.1 System Failures. Several types of failures could, at times, result in raw sewage entering areas near project components, lowering the water quality and creating health hazards and odors. Among them are: pipeline breaks and corrosive failures; holding basin levee breaks; sewer blockages; holding basin flooding and washouts, especially during hurricanes; power outages; and mechanical equipment breakdowns. Although the effects of any of these failures would be temporary, the fact that they may happen at any time in the project's life makes them potential minor long-term impacts. While it is very probable that each of these failures (with the exception of a holding basin levee break) will occur several times during the project's 20-year design life, the effects of any of them, though possibly locally severe, will be relatively insignificant in terms of the overall project area. The two

bottom sediments). The most that can be expected is a slight improvement in DO and suspended solids levels, and a reduction in coliform bacteria counts. These water quality improvements constitute a significant step in reducing the existing public health hazard. However, like any sewerage system, this project addresses only one facet of the total water quality problem, reducing the sewage pollutants discharged to surface waters to an acceptable level. By providing this reduction of pollutants, the proposed project will significantly lower the coliform counts in both the GIWW and Bayou Black Reservoir, thereby providing a slight reduction in the cost of water purification. More importantly, by reducing the pollutant loading on Bayou Black, the project may allow that stream to eventually restore itself by natural means.

5.3 AIR AND SOUND QUALITY IMPACTS

5.3.1 Short-Term Impacts During Construction

5.3.1.1 Air Quality. Exhaust emissions from construction equipment and traffic delayed or caused to drive farther by the project will have a very minor impact on the area's air quality. The dispersed work locations and the topographical and climatic conditions make it unlikely that emissions will become concentrated. Dust is not expected to be a problem because of the general dampness of the area and its frequent rainfall. Some sprinkling of construction areas may be required during prolonged dry periods.

5.3.1.2 Sound Quality. Noise is an unavoidable temporary consequence of operating construction equipment. The linear nature of the work, except at the plant sites, and its general remoteness from areas of dense occupancy by either humans or wildlife, will tend to reduce the degree of impact, which is

not expected to be severe in any case. Expanding the South Plant will have few noise impacts because of its isolation. Work at the North Plant will need controls because of the proximity to densely-populated areas. All equipment will be equipped with properly-designed, functioning mufflers, and be shut off when not needed. Work in heavily-populated (human or wildlife) areas will be scheduled for daylight hours only, except for some road, bayou and canal crossings where night work may be desirable to avoid traffic congestion.

5.3.2 Long-Term Impacts During Operation

5.3.2.1 Air Quality. No direct air quality impacts are expected from the operation of the proposed project. The amount of development expected to be induced by the project is of such limited magnitude that the resulting air pollutant emissions can be considered negligible. The Air Quality Section of the Louisiana State Division of Health has advised that they foresee no adverse impacts on ambient air quality resulting from the project (Reference 30).

5.3.2.2 Odor. Odors are not expected to be a problem during normal operation of the proposed project. The South treatment plant will be located nearly 3 miles from residential areas, and the North plant, although nearer to inhabited areas, will be generally downwind from them, as the prevailing winds are from the south.

All holding basins and treatment lagoons will be aerated to prevent septic conditions from developing. Potential problems could develop as a result of mechanical failure of the aerators or pumps, but adequate maintenance will make these occurrences very infrequent and short-lived.

Localized beneficial odor impacts should occur in the vicinity of the existing seafood processing plants and

treatment facilities. Eliminating use of poorly-functioning septic tank systems should also reduce existing odors.

5.3.2.3 Noise. Project operation is not expected to produce offensive noise levels at any of the facilities. The treatment plants are not immediately adjacent to any sensitive receptors, and during normal operation do not produce noise levels above approximately 75 dbA. (The 75 dbA sound level does not prevent conversation in normal tones even immediately at the source.) Pumps will all be electrically powered and will be entirely enclosed.

5.4 IMPACTS ON THE BIOLOGICAL ENVIRONMENT

5.4.1 Impacts on Vegetative Resources

Removal of vegetation is an unavoidable adverse impact of construction. Assuming a 100-ft-wide construction zone along the entire length of the gravity sewers, which includes the parallel installation of the major and minor force mains, an estimated 3,230 acres will be disturbed by constructing the project. Most of this affected area will be in unvegetated public roads and streets, but about 220 acres of wetlands will be disturbed. However, this disturbance is a minor adverse impact, considering the total area of wetland available, and that, except for the larger trees, natural revegetation will occur within one or two growing seasons.

Local aquatic vegetative systems will be slightly affected by the siltation and turbidity resulting from erosion of trenches and plant sites, and from the dredging required for bayou and wetlands crossings. Temporary changes in local drainage patterns may also allow some minor amount of saltwater intrusion before the trenchline is restored to its original contours. These impacts are deemed very minor when compared to the amount of turbidity already present.

The long-term impact of both construction and operation of this project on vegetation will be minimal. The total new area to be permanently cleared or dredged for holding basins is approximately 24 acres, no more than 10 acres of which are wetlands. The vegetation at these sites will be destroyed, with no re-growth. Plant communities permanently affected by pipeline installation will primarily be the bottomland hardwood forest areas and cypress-tupelogum swamps, where cutting of slow-growing woody species will occur along the pipe route. Crossings of previously undisturbed bottomland forests or cypress swamps are expected to extend approximately 95,100 ft, affecting approximately 220 acres. Pre-project conditions will be naturally re-established within several seasons, except for replacement of the larger trees and for about 40 acres of permanent maintenance easements, which must be kept clear enough for access. No threatened or endangered vegetative species is known to be impacted by the project.

5.4.2 Impacts on Invertebrates

5.4.2.1 General Comments on Invertebrates. Placing sewer lines along the high ground bordering the major bayous, and within or near highway rights-of-way, will fall within the area of greatest human habitation and coaction. While these areas do support invertebrate communities, the human influence is already an integral part of the system, and disturbance of these grounds will only temporarily interrupt the status quo. No endangered species is involved and no cardinal food chain organism would be involved to the extent of breaking the trophic scheme. In none of these areas, either high- or lowlands, will the dredging reveal any stratum that is likely to render the disturbed area inhospitable to repopulation.

The proposed construction, and its attendant erosion and siltation, can only temporarily interrupt the invertebrate communities, and every opportunity will be available for quick repopulation of the disturbed area by virtue of the vast aquatic habitat and the fact that this habitat is not isolated from the remainder of the Louisiana marsh. Operation of the project will have a generally beneficial, but minor impact.

5.4.2.2 Oyster Production. The major immediate problem facing the oyster industry in Terrebonne Parish is in the central zone, where encroachment by untreated wastewater has been rapid, and promises to get worse. Operation of the proposed regional sewerage system would undoubtedly go far toward correcting this immediate problem, and might improve fecal coliform readings in the presently-closed oyster grounds to the point that they might be reopened. This cannot be stated with certainty, however, because of the limited water quality data and the area's extremely complex hydrology. Construction of the project will have no effect on oyster grounds.

5.4.2.3 Shrimp Production. Shrimp, crabs, and finfish are mobile forms that are not as closely dependent on water quality in a specific area as are sessile species like oysters. Shrimp can simply avoid regions of low oxygen, etc. In addition, the physiology and food habits of shrimp are unlike those of the oyster, so that concentration of pathogenic organisms in shrimp or crab tissue is not generally a problem from the standpoint of human consumption. In fact, it is possible that increased levels of organic matter resulting from sewage pollution could, under certain conditions, be favorable for shrimp production. For example, the Grass shrimp (Paleomonetes

pugio) has recently been shown to depend on nematodes for a major part of its diet. Nematodes are most abundant in sediments high in organic content. For these reasons, operation of the proposed project is not expected to have any appreciable effect on the shrimp fishery in Terrebonne Parish.

Probably the greatest threat to present high levels of coastal Louisiana fishery production in general, and to shrimp production in particular, is the loss of wetland area. To the minimal extent that the proposed project induces growth in or occupies marsh areas, its construction will cause a loss of shrimp habitat. This habitat loss will be insignificant relative to total shrimp habitat in Terrebonne Parish, however.

5.4.3 Impacts on Vertebrates

5.4.3.1. Fishes. There is little likelihood that either construction or operation of the proposed sewage treatment system will directly have significant adverse impacts on fish communities. The elimination of numerous point sources of untreated sewage discharge throughout the central and southern portions of the Parish should generally enhance water quality. On balance, the proposed project will be beneficial to the aquatic species of Terrebonne Parish.

5.4.3.2 Amphibians and Reptiles.

a. General Comments. There are no apparent negative effects to any of the resident amphibians or reptiles from the proposed project. In fact, other animal groups which constitute food sources for amphibians and reptiles are likely to benefit from this project. It is possible that the local populations of animals inhabiting the area around the effluent discharge will increase because of the localized enrichment. However, this will be balanced by a loss of nutrients at those discharges eliminated by the project.

b. American Alligator. There are no studies that directly address the influence of sewage effluent on alligator populations. It seems likely that there will be very little, if any, direct negative or positive effects of the operation of the sewage project on the alligator. Construction activities associated with the proposed project could have minor adverse impacts on alligators. The construction of sewer lines through marsh areas could disturb active nest sites, and pipeline trenches left open overnight could pose a hazard to alligators.

5.4.3.3 Birds.

a. General comments. Because of their highly mobile nature, most bird species will probably not be affected by construction or operation of the proposed sewerage system, particularly those facilities that parallel highways. Where pipelines cross wetlands, summer and permanent residents could be adversely affected by project construction. These species generally nest from April to July, and any nests directly in construction areas would likely be destroyed. The Barred Owl, Great Horned Owl and Bald Eagle nest in the winter months.

Holding ponds and treatment lagoons may be beneficial to some bird species. Concentrations of herons, egrets and some ducks (e.g., Scaup) are sometimes attracted to such ponds, presumably because of concentrations of certain food items.

b. Wading bird nesting colonies. Neither of the two nesting colonies discussed in Section 2.4.3.3 are near enough to the proposed sewerage system to be adversely affected by primary construction impacts.

c. Bald Eagle. Two of the nests described in Section 2.4.3.3 are located near the interface of swamp forest and cleared land, but both are at least 0.8 miles from the nearest

proposed sewer lines, so that they will not be adversely impacted by construction activities.

d. Peregrine Falcon. Adverse effects of construction or operation of the proposed sewerage system on wintering populations of Peregrine Falcons are extremely unlikely, since it is a wide-ranging species, and is not known to inhabit the general area.

5.4.3.4 Mammals. Since four holding basins will likely be placed in wetlands, the land so used (approximately seven acres) will be removed from total furbearer habitat. The levees that will be constructed around the holding ponds may well be used by muskrats, nutria and other furbearers as burrowing or nesting sites (see Lowery, 1974b). Net impacts on mammals, either adverse or beneficial, will be nearly negligible.

5.5 EFFECTS ON ARCHAEOLOGICAL AND HISTORIC SITES

As a part of the EIS study, a Level I Archaeological Assessment and Preliminary Field Survey was conducted in Terrebonne parish in the spring of 1978. This report is contained in the Technical Support Document. The purpose of this survey was to locate and evaluate all known historic and prehistoric sites which might be affected by the proposed project.

The archaeological survey located twenty prehistoric and four historic sites within the vicinity of the proposed project. In addition, seven localities where sites had been previously reported were examined, but no evidence of cultural activity was found. Of the twenty-four sites located, twelve were deemed to be highly significant and in need of preservation in some fashion, while two were found to require further testing, as access to them was denied by the property owners.

Measures proposed for the protection of these sites included minor realignment of collection lines, protection and investigation prior to construction, and/or monitoring of construction activities by a professional archaeologist.

In order to protect these historic and prehistoric resources of the parish, in cooperation with the State Historical Preservation Officer and in accordance with the Advisory Council's "Procedures" (36 CFR 800), implementation of the recommendations of the archaeological survey, Cultural Resources Impact Assessment, Houma-Terrebonne Regional Sewerage Plan (reference 111), will be made a condition of the Step 2 grant.

5.6 SOCIOECONOMIC IMPACTS

5.6.1 Short-Term Impacts During Construction

5.6.1.1 Traffic Congestion and Safety. Alternate routes available to vehicular and aquatic traffic are severely limited, and existing rights-of-way tend to be quite narrow. Fortunately, traffic volumes are relatively low, and are lowest where alternative routes are most limited. Nevertheless, the inconvenience caused to the traveling public by constructing the project will be considerable, especially at the many road, canal, and bayou crossings. The total time lost and the additional fuel consumed by taking alternate routes and being delayed by construction activities will be locally significant. The additional safety hazards occasioned by construction equipment and personnel in or near the traveled ways, the miles of trenches close to roads, and the numerous material storage areas required by the project, will also be significant. The attractiveness of construction sites, especially spoil piles and material stockpiles, as places for children to play

is well known.

5.6.1.2 Visual. The extent of this project will have a major visual impact on the entire parish, particularly the more densely-populated areas. While the degree of unsightliness depends largely on the viewer's attitude, torn-up front yards, mud on the pavement, and the view of miles of untidy bare-earth trenches on both sides of the roads will adversely impact the visual aesthetics of the parish. Time and money lost in dealing with public complaints could be significant.

5.6.1.3 Economic. The construction jobs and material sales generated by the project will have a significant, but temporary, beneficial effect on the parish's economy.

5.6.2 Direct Land Use Impacts

The land use of approximately 30 acres will be permanently changed by the proposed project. Approximately 23.8 acres will be required for the new major holding ponds and pump stations, which are shown on Figure 14. Seven of the holding basins will be incorporated into existing lagoons and will not require additional land.

Pump stations for the Gravity System will require approximately 5 acres of additional land. The proposed additions to the North and South treatment plants will be accommodated on land presently owned by the City of Houma and the Terrebonne Parish Police Jury.

The uses of a sizeable, but undetermined, acreage will be restricted by sewer easements. Since the principal restriction is usually a prohibition against building structures on an easement, careful route selection for sewers on easements will generally negate this impact.

The land to be taken for the holding basins and pump stations is largely vacant now. Some of the land required in

the southern areas of the parish is in, or borders on, wetland, while that in the north is generally wooded. In only two locations will more than 1.6 acres be taken for a single holding basin, and less than 25 acres will be taken in the entire parish. Side slopes of the embankments and the surrounding areas will be seeded in grass after construction to prevent erosion and lessen the visual impact.

5.6.3 Secondary Land Use Impacts

All land use changes except those resulting directly from taking land for the project facilities are considered secondary impacts.

5.6.3.1 Anticipated Land-Use Changes. The existing and projected development areas, as presented in the Houma-Terrebonne Parish Comprehensive Plan of 1973, are shown in Figures 12 and 13. The major force mains of the proposed sewerage project are shown in Figure 14. The areas planned for development are generally those which will be served by the proposed project.

Providing regional sewerage facilities is not expected to have a major impact on future land use in Terrebonne Parish. New development is the result of a complex interaction of social, political, and economic forces, and the existence of regional sewerage facilities is only one of many variables affecting development. Other factors, such as the availability and suitability of developable land, the quality and location of schools, access to employment and recreation areas, the aesthetics and social characteristics of the neighborhood, and the local tax rates also play major parts in the decision process.

The major sewer lines will all be force mains. Unlike gravity interceptors, which can be easily tapped at any point, force mains can be easily hooked into only at holding ponds and pump stations without risking overloading pump and

pipe capacities. The holding ponds are presently planned at approximately 7-mile intervals along the bayous. This, to some extent, reduces the project's ability to induce development in adjacent lands where development is not presently planned.

Another factor limiting development potential is that some developable land is presently profitable in its undeveloped status. These lands are either in agricultural use or are being kept vacant and leased for their mineral rights, and are thus less likely to be developed.

The problems inherent in developing wetland areas, including poor foundation conditions and frequent flooding and drainage problems, make increased large-scale development in these areas unlikely. Individual builders or developers may find it economically feasible to construct homes in wetland areas in isolated instances, particularly where regional sewerage facilities eliminate the need for septic tank systems, which are generally ineffective in high water-table areas. Drainage problems and flooding will probably limit this kind of development, however, as will vigorous enforcement of the recently-approved Amended Ordinance 1861, Land Use and Control Measures, which satisfies the requirements of the Federal Flood Insurance program. While this ordinance will prevent development below the level of the 100-year flood, it will not prevent a builder from filling a wetland area to an elevation above that line. The expense of providing large amounts of suitable fill material in the southern part of the parish, however, makes any large development unlikely.

While the factors mentioned above will tend to inhibit project-induced growth, the project will have several effects which may lead to additional development. The presence of the regional sewerage system will make it unnecessary for a

developer to provide treatment facilities for a subdivision, thereby reducing the development costs passed on to buyers, depending upon the amount of the connection charge, if any, required by the parish.

In summary, it seems the provision of regional sewerage facilities alone will not have a major impact on the location of new development in Terrebonne Parish. The proposed project is planned to serve only the higher land areas, where development has already occurred, and where development will continue to occur whether or not the project is implemented.

5.6.3.2 Impacts of Land-Use Changes. Future development in the Houma area is expected to continue to follow the general pattern of recent years, centering mainly along the highways radiating from Houma. Most of this development is also expected to occur with or without the regional sewerage facilities, just as it has been occurring through the last decade.

a. Secondary Effects on Public Services. Existing development in Terrebonne Parish is already dispersed along all of the bayou ridges and has full water, gas and electric service. Therefore, major additions to the utility distribution network will not be required. Likewise, the existing road network already serves all areas to be sewered and, thus, local residential streets and collectors are the only roads that will be required by new development. Solid waste collection and fire and police protection are already provided to all areas to be sewered; therefore, while any induced development will require more service, it will be provided more efficiently as a result of increased density. In all cases, the part of the new development that would be induced by the proposed project is expected to be only a small percentage of the total. Since future growth will fill into vacant areas adjacent

to already-developed areas, only very minor effects on the public services distribution system will be caused. In some cases, the efficiency of the system will be improved by increasing the population density of the service area.

b. Secondary Effects on Energy Consumption. Any growth induced by the proposed sewerage project will have minor adverse and beneficial effects on regional energy consumption. Some of the induced development will be drawn from the older, urbanized areas of Houma and will result in increases in vehicle miles traveled to employment and shopping areas. The increases are not expected to be large, however, and will be tempered by the trend of new industries and commercial centers to locate in the suburban fringe. Another segment of the induced development will be drawn from neighboring parishes and from outlying parts of the parish by the opportunity to upgrade housing by moving into newly developed residential areas. In most cases, these households will be moving nearer to employment and commercial centers and will therefore result in a decrease in the vehicle miles traveled, with the attendant decreases in gasoline consumption and air pollutant emissions. The net effect of these beneficial and adverse effects is unlikely to be appreciable in either direction.

c. Other Secondary Effects. The loss of urban area population induced to move to newly-sewered areas will cause short-term inefficiencies in the vacated areas. A decrease in the central city population can lead to reductions in commercial activity and the city tax base, along with some detrimental effects to the quality of the neighborhoods losing residents. To some extent, these adverse effects will be offset by newly-created households moving into the vacated areas.

Another secondary effect of the proposed project will be increased property values for all those properties receiving sewerage service. This economic gain will be offset to some extent by the special assessment levied to pay for the collection system, but there will be a net local benefit remaining, since Federal funds will pay 75 percent of the initial cost of the system. This increase in property values also increases the assessed valuation of the parish, thereby increasing revenue to help offset the costs of providing the required public services to the induced development.

A high percentage of the land taken for whatever growth is induced is expected to come from agricultural usage. This will result in changes in the type and amount of storm runoff. Newly-developed areas will produce more runoff than they had in the undeveloped state, and this runoff will carry more automobile-produced pollutants such as oils and rubber. This adverse effect will be balanced to some extent by elimination of the previous agricultural runoff. Agricultural runoff is very high in nutrients, and also constitutes a major non-point source of pollution.

5.6.3.3 Summary of Secondary Effects. The regional sewerage plan for Terrebonne Parish will not lead to major induced development. Because of the limited amount of dry, developable land in the parish, development has already occurred along the entire length of the major bayous, and the remaining undeveloped usable land is interspersed throughout these developed areas. Thus, most development induced by the project will contribute to greater density around the Houma area, and will result in more efficient distribution of public services. The adverse effects, such as encroachment on additional wetland areas, increased traffic congestion and air pollution, and increased demands for public services, that will actually be induced by

the project are deemed to be minimal.

5.6.4 Economic Impacts.

5.6.4.1 Capital Costs. The local share of the capital costs of the treatment plants and the Holding Basin System, estimated to be $12,856,000 at updated 1978 prices, is to be funded separately from the Gravity System. The former category was to have been funded by an $8,000,000 bond issue authorized in September, 1973. Of that amount, about $7,622,000 remained in the Parish-wide Sewer Construction Fund in February, 1978. Even without considering inflation, an additional $5,234,000 will be required for the local portion of those costs. The parish should have no financial difficulty in issuing more general obligation bonds to raise this sum. Table 18 presents the estimated costs for the total system. All costs have been updated to 1978 price levels using construction cost indices.

The local share of the cost of the Gravity System is to be funded by a special assessment authorized by the Terrebonne Parish Police Jury. The Secretary-Treasurer of the Police Jury indicates that the total cost will be equally apportioned to all property owners fronting on components of the Gravity System on a linear front-foot basis. Considering that there are an estimated 1,406,625 linear feet of sewer in the Gravity System, having an estimated 1978 local cost of $20,866,000, and assuming that half of the length of the system will be fronted on both sides, the 1978 assessment will be about $10.00 per front-foot.

5.6.4.2 Other Costs.

In addition to the taxes paid to retire the bonds and the special assessment to construct the Gravity System, local property owners will incur other costs which include service line construction to the gravity system, the hookup,

TABLE 18

PROJECT COST ESTIMATES

(June, 1978)*

	Treatment Plants Force Mains Holding Basins	Gravity Collection System	Total Costs
TOTAL PROJECT COSTS	$44,794,000	$60,767,000	$105,561,000
TOTAL ELIGIBLE COSTS	42,584,000	53,201,000	95,785,000
FEDERAL AID	31,938,000	39,901,000	71,839,000
LOCAL SHARE	12,856,000	20,866,000	33,722,000

* All project cost estimate items have been updated to June, 1978 price levels using construction cost indices.

SOURCE: Treatment plant costs adjusted to June, 1978 price levels from data on page C-322 of Supplement to Facility Plan Report For Houma-Terrebonne Regional Sewerage Facilities, G.S.T. Engineers, August, 1976.

Gravity Collection System costs from page 7, Amendment I to Facility Plan Report Supplement, G.S.T. Engineers, June, 1978.

the inspection fee, and a monthly user charge. The service line and hookup costs cannot be easily estimated because of the varying lengths required and differences in the difficulty of hookup and in contractors' and plumbers' rates, but will probably be on the order of $200-$500 per connection. It is estimated that the inspection fee will be $15, and that the monthly user charge will be about $12.70, computed by dividing the $3,422,800 estimated annual O&M costs equally among 22,500 customers. The combined effect of these charges could pose a financial hardship for residents in lower-income brackets, and will not be easily borne by some of the parish's residents.

5.6.4.3 Indirect Economic Impacts. The secondary economic impacts of the proposed project on developers cannot be determined precisely. They will no longer need to provide package treatment plants for projects in unsewered areas, thereby lowering the costs passed on to buyers. However, this economy will be offset to some extent by the connection fees assessed by the parish, if any. The amount of these charges has not been determined; but they should be set as nearly equal as possible to the cost of providing package plants to avoid inducing rapid development.

The major indirect economic impacts of the proposed project on industrial development in Terrebonne Parish will be primarily on the seafood processing industry. The existing shrimp canning plants are now faced with the prospect of either individually providing adequate treatment for their discharges in order to qualify for an NPDES permit, or being forced to close. Installing adequate individual treatment facilities could place a great financial burden on these plants. The most economically efficient solution to this

problem would be to serve these plants with regional sewerage facilities.

5.7 CUMULATIVE IMPACTS

The proposed regional sewerage plan is only one of several major projects either underway or being planned that will have cumulative impacts on wetlands in Terrebonne Parish. Maintaining and enlarging the navigation canals, and constructing and operating additional forced-drainage areas will have cumulative effects on the parish's wetland resources.

5.7.1 Forced Drainage Projects

The proposed forced drainage projects being constructed by the parish will have the greatest direct impact on wetlands. According to the forced-drainage draft EIS (Reference 74), the parish-wide system can convert up to 45,000 acres of present wetland into dry, developable land. The availability of a large amount of well-drained, flood-free vacant land provided with regional sewerage service could lead to significant increases in development in the southern part of the parish. Without the forced-drainage project, however, the amount of development will not be nearly as great, and the proportion in wetland areas will be very limited.

A recently approved emergency permit will allow constructing Forced-Drainage Project 1-1A in the area between Bayou Terrebonne and Little Bayou Black northwest of Houma. This project will eliminate flooding on about 10,000 acres, much of which is presently marsh. Development in this area will undoubtedly be more rapid and extensive than it would be without the forced-drainage project.

Forced-drainage projects may also increase the possibilities of sewer line breakage by draining soils with high subsidence potential. Where the soils exhibit a wide

range of subsidence potential, differential settlement initiated by the forced-drainage project could lead to breakage of sewer lines.

5.7.2 Navigation Canals

Dredging new navigation canals and expanding existing ones will adversely affect the parish wetlands. Besides the direct taking of wetlands for canal right-of-way and spoil areas, the canals increase fresh water run-off and allow saltwater intrusion during periods of low rainfall and high tides. The canals also cut off the area's natural hydrologic flow patterns, depriving certain areas of fresh water flows. All these factors combine to destroy or alter adjacent wetland areas and their resident biological communities.

5.7.3 Summary of Cumulative Impacts

The combined effect of these three projects constitutes a significant adverse impact on the wetland resources of Terrebonne Parish. While the regional sewerage plan will indirectly cause minor impacts on wetlands, this effect will be extremely small when compared to the primary impacts of the other two projects.

6. COORDINATION

6.1 STATE AND LOCAL REVIEW

The proposed project has been coordinated with the Houma-Terrebonne Regional Planning Commission, the South Central Planning and Development Commission, the Office of State Planning, the Bureau of Environmental Health, and the Teche District Clearinghouse. The State Clearinghouse stated that the concept of the proposed project is not in conflict with the State of Louisiana's plans, goals, or objectives (Reference 42). Recent comments of the Houma-Terrebonne Regional Planning Commission are included in Appendix A.

A formal public hearing was held on May 24, 1976 when the Facility Plan was completed. The purpose of this hearing was to solicit comments from the public on the economic and social effects of the location and design of the parish-wide sewage collection-and-treatment system, and on the potential environmental effects of the project and its alternatives. Notice of the public hearing was also sent to the agencies listed in Table 19. The certified transcript of the public hearing indicates that the public made no comments. The Bureau of Outdoor Recreation made the only written comment. This letter requested the Police Jury to consider the feasibility of incorporating public recreation facilities as a multiple use along with the pollution control facilities by developing trails along sewer right-of-ways. The potential for developing trails along sewer rights-of-way was suggested.

TABLE 19

AGENCIES NOTIFIED OF FACILITY PLAN PUBLIC HEARING

U.S. Govenment Agencies:

- Army Corps of Engineers, New Orleans
- Bureau of Land Management
- Bureau of Mines
- Bureau of Outdoor Recreation
- Bureau of Reclamation
- Department of Housing and Urban Development
- Geologic Survey
- National Park Service
- Sport Fisheries and Wildlife Service

Louisiana State Agencies:

- Coastal Commission
- Commission on Intergovernmental Relations
- Governor's Office on Environmental Quality
- Historic Preservation Officer
- Land Offices
- Wildlife & Fisheries

Source: Adapted from Facility Plan Report, Volume II, Houma-Terrebonne Regional Sewerage Facilities, GST Engineers, 1976.

6.2 COORDINATION OF THE EIS

Review copies of this draft EIS have been forwarded to local, state, and federal agencies and conservation groups and private citizens expressing interest in the project. All comments received, along with EPA's responses to these comments, will be incorporated into the final EIS.

REFERENCES

REFERENCES

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APPENDIX A

DOCUMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FIRST INTERNATIONAL BUILDING
1201 ELM STREET
DALLAS, TEXAS 75270

RECEIVED
AUG 10 1977
ENV SECTION

June 20, 1977

TO ALL INTERESTED AGENCIES AND PUBLIC GROUPS

As required by Federal Register Guidelines (April 14, 1975) for the preparation of Environmental Impact Statements (EIS's), an environmental review has been performed on the proposed EPA action below:

1. Houma-Terrebonne Regional Sewerage Plan
   Houma, Terrebonne Parish, Louisiana

2. C-220356-01-0

3. Estimated EPA Share: $17,230,000.00
   Estimated State Share: $ -0-
   Estimated Local Share: $ 5,750,000.00

The purpose of this document is to modify the negative declaration issued for the Houma-Terrebonne Regional Sewerage plan on February 25, 1977. Terrebonne Parish is unique in that the entire rural population is located on elevated portions of natural bayous which extend out in all directions from Houma; very little land surface in Terrebonne Parish is above the five foot mean sea level contour line. Reaction to the negative declaration has expressed concern with the secondary growth impacts on wetlands and other areas from the construction of long force mains into both the south and the northern areas of the parish. By notice of intent this date, EPA has determined to prepare an Environmental Impact Statement (EIS) on those portions of the project not covered by this modified Negative Declaration.

This negative declaration covers the work as follows:

1. Rehabilitation and upgrading of existing sewer lines in the developed areas in and around Houma.

2. New interceptor lines in Houma and three adjacent, developed sewerage districts (#12, #13, and #24) to reroute flows for efficient transport to the treatment plants.

3. Both North and South plants will be upgraded to provide service for the existing sewered population, the projected 20-year growth of the sewered areas and the existing unsewered population of the parish. No capacity will be provided to serve the future growth from unsewered areas.

4. Both plants will be of modular design, whereby future loading may be accommodated if the need arises.

A Step II grant for lines directly in the wetlands will not be granted at this time. All line work covered by this negative declaration will follow existing roads, railroads, etc.

Both new plants involve the use of existing facilities. The North Plant will be a 12.0 mgd activated biological filtration unit, located about two (2) miles northwest of downtown Houma. The South Plant will be a 10.0 mgd aerated pond system with dissolved air floatation, located approximately six (6) miles southeast of Houma. Both plants will discharge into the St. Louis Canal. A total of 74,930 feet of force main work would be required, ranging in size from 4-inches to 16-inches in diameter. (See enclosed map.)

Approximately 9,586 feet of 24-inch and 30-inch gravity interceptors will be laid. Once the pipe has been placed in the ditch and joints connected, the trench will be backfilled and leveled.

This segment of the originally proposed project will include two major interceptors that have been relocated to avoid construction in the wetlands. They are designed to transport wastewater flow to the North Plant and have been rerouted to avoid these sensitive wetland areas.

The land in Terrebonne Parish slopes generally and gently southward with a maximum elevation of about ten (10) feet above mean sea level and a minimum at one and one-half (1.5) feet above mean sea level. Maximum elevations occur in the northwest section of the Parish, and along the natural levee ridges of the bayous. The water quality of the area is adversely impacted as a result of the high water table and the poor condition of existing wastewater treatment facilities.

The State Archaeologist has requested an on-the-ground survey and further testing. This will be completed and approved by the State Archaeologist before construction begins. Mitigative measures, if necessary, will occur. This will be performed as part of the Step II work, and will be a grant condition of this project.

The Southdown Plantation House is currently listed on the National Register of Historic Places and is located within the project area. Any proposed project work will occur at least a half of a mile away from the Southdown Plantation House, but a survey will be conducted prior to construction. Should this survey identify cultural resources eligible for inclusion to the National Register of Historic Places, the Advisory Council of Historic Preservation will be afforded an opportunity to comment in accordance with its procedures, as appropriate, prior to taking any action which would affect the resources. This will be a grant condition of this project.

There are four endangered species located in Terrebonne Parish. The Bald Eagles' nests in Terrebonne Parish are to the East and Southeast of the populated area of Houma. The Brown Pelicans are established on the coast

of the parish and east of the project area. The Peregrine Falcon does not breed in Terrebonne Parish, but is occasionally found in the coastal areas. The fourth member of endangered species located in the parish is the American Alligator. The alligator is, however, abundant in the marshes of Coastal Louisiana, including the wetlands of Terrebonne Parish. Because construction will not be through the wetlands in this segment, no impact on this species is anticipated.

To ensure that critical habitats of rare and endangered species (i.e. Bald Eagle, Brown Pelican, and Peregrine Falcon) have not been disturbed by construction activities, all known nesting sites within the project area will be photographed by the contractor or his representative before and after construction. A grant condition of the project will dictate that all available safety methods and precautions be utilized for protection of these endangered species. The U.S. Fish and Wildlife Service will review these procedures and aid in determining the sites to be photographed to reduce possible adverse impacts to these habitats and/or species.

The type of land use at the site of the proposed treatment facilities will not change substantially, since the existing land use is presently for sewage treatment facilities. The North Plant will require the purchase of 12 additional acres. The South Plant facilities will utilize approximately 1.2 additional acres of city owned land for road work and dissolved air floatation units. No people are expected to be relocated.

Any odor problems should be short in duration because of an efficient maintenance program supported by a telemetric monitoring system.

All machinery to be used in construction activities will be equipped with noise-suppressing devices. Dust problems, if any occur, will be controlled. No blasting will be required for the proposed project. Areas around the proposed facilities will be seeded with grass so as to be aesthetically pleasing.

Water quality for the area will generally improve, since several untreated point sources of discharge will be treated by the proposed facilities. The effluent from the two (2) plants will conform to areawide water quality standards.

The North Plant will be protected from flooding by the proposed parish wide forced drainage project. Additional protection will be provided as necessary. The South Plant includes flood protection or other necessary measures according to Federal Flood Insurance requirements. Flood protection for lines and associated pump stations has been designed according to Federal Flood Insurance requirements. The proposed project will not have any effect on the movement of floodwaters.

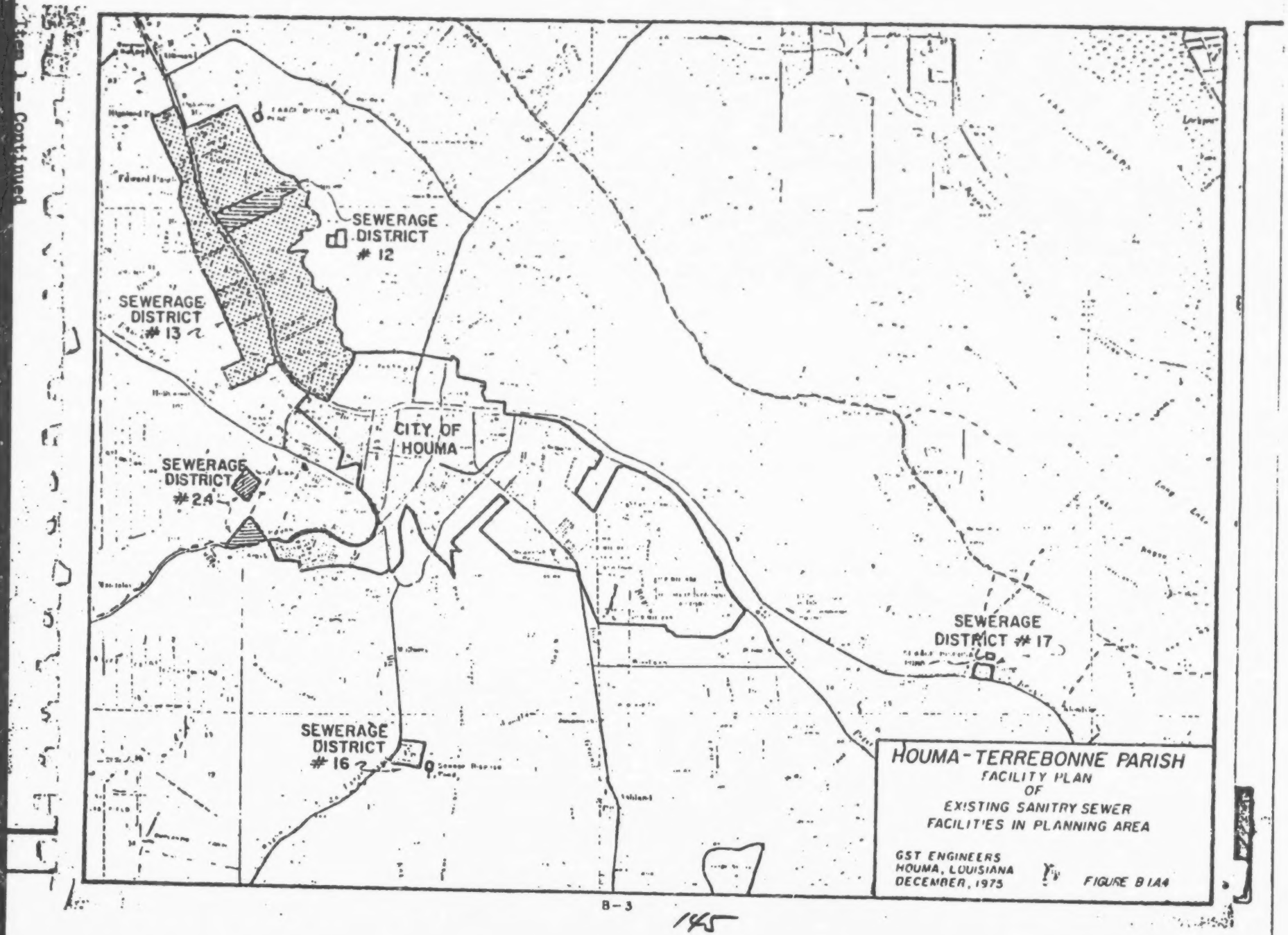
The anticipated land use and socioeconomic activities related to the proposed action conform with the existing land use plans as developed by the South Central Planning and Development Commission, the Houma-Terrebonne Regional Planning Commission, the Terrebonne Parish Police Jury and the Houma City Council.

Each area's share or the percent of its economic area population for the years 1940, 1950, 1960, and 1970 were researched and recorded. Both the years and the shares were transformed by taking the natural logarithm of the values. Straight line interpolations between the 1970 actual value and the 2020 projected value were used to obtain projected values for the years 1980, 1990, 2000, and 2010. Aerial photographs taken especially for this project were used in doing this. For ease in computing future flows per area, commercial and industrial development was converted into equivalent population. The total present population of the project area is 91,343, but by the design year of 1996 the population should attain 143,372. The plant capacity to be provided will not be adequate to serve the entire projected population. No provision will be made for the appoximately 17,629 increase in population projected for the unsewered areas. As in surrounding areas, industrial development in the Parish is increasing. This segment of the project provides improved transport and treatment of wastewater for the concentrations of growth in the Houma area. Line work will serve only existing sewered areas.

In attempting to regionalize the sewage treatment facilities for Terrebonne Parish, it was necessary to assess the existing facilities in terms of possible rehabilitation, upgrading, and expansion. Several alternative plans were proposed, with the number of plants ranging from one (1) to six (6). The main reasons for choosing the proposed plan were based on economics, efficient use of the existing facilities, and the effect of two (2) point sources of discharge, instead of several, upon the environment. The no action alternative was not chosen because if the project is not implemented, the rapidly deteriorating water quality, caused by hundreds of point sources of discharge and untreated wastewaters would eventually cause the decline of the valuable aquatic resources of the Parish. The determination to continue with a portion of the project was made to avoid an unnecessary delay in providing improved wastewater facilities that are determined to have a net beneficial impact on the environment.

The review process indicated that significant environmental impacts would not result from the proposed action or that significant adverse impacts have been eliminated by making changes in the project.

This action is taken on the basis of a careful review of the engineering report, environmental impact assessment, and other supporting data, which are on file in the above office with the environmental impact appraisal and are available for public scrutiny upon request. Copies of the environmental impact appraisal will be sent at cost on your request.


SEWERAGE DISTRICT # 12
SEWERAGE DISTRICT # 13
CITY OF HOUMA
SEWERAGE DISTRICT # 24
SEWERAGE DISTRICT # 17
SEWERAGE DISTRICT # 16
HOUMA-TERREBONNE PARISH
FACILITY PLAN
OF
EXISTING SANITRY SEWER
FACILITIES IN PLANNING AREA
GST ENGINEERS
HOUMA, LOUISIANA
DECEMBER, 1975
FIGURE B1A4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FIRST INTERNATIONAL BUILDING
1201 ELM STREET
DALLAS, TEXAS 75270

June 20, 1977

TO ALL INTERESTED GOVERNMENT AGENCIES, PUBLIC GROUPS AND OFFICIALS:

Pursuant to EPA Final Regulations (40 CFR part 6) for the preparation of Environmental Impact Statements (EIS's), attached is a Notice of Intent to prepare an EIS on certain portions of the proposed construction of wastewater treatment facilities in Terrebonne Parish, Louisiana.

If you or your organization needs additional information or wishes to participate in the preparation of the Draft EIS, please contact Mr. Clinton B. Spotts, Regional EIS Coordinator, First International Building, 1201 Elm Street, Dallas, Texas 75270.

John C. White
Regional Administrator

Enclosure

Item 2: Notice of Intent,
June 20, 1977

RECEIVED
AUG 10 1977
ENV SECTION

146

NOTICE OF INTENT
ENVIRONMENTAL PROTECTION AGENCY, REGION VI

1. Project Location:

City: Houma
Parish: Terrebonne
State: Louisiana

2. Proposed EPA Action: A Draft EIS is being prepared on a portion of the Houma-Terrebonne Regional Sewerage Plan located in Terrebonne Parish, Louisiana. This portion includes the areas that will be affected by the construction of a collection system to accommodate loading from unsewered areas north and south of Houma (see attached map). These facilities include 603,273 feet of force main sewer lines which would require about 160 acres of land, and the expansion of the south plant from 10 mgd to 13 mgd and the expansion of the north plant from 12 mgd to 16 mgd. The majority of this proposed line construction will be on the ridgelands along roadways, but an estimated 17 percent will cross wetland areas.

3. The major issue of wetlands will be thoroughly discussed in the EIS under the following areas of concern:

a. Secondary impacts of induced development and encroachment into wetlands.

b. Primary impacts on ecological communities, rare and endangered species, and archeological resources.

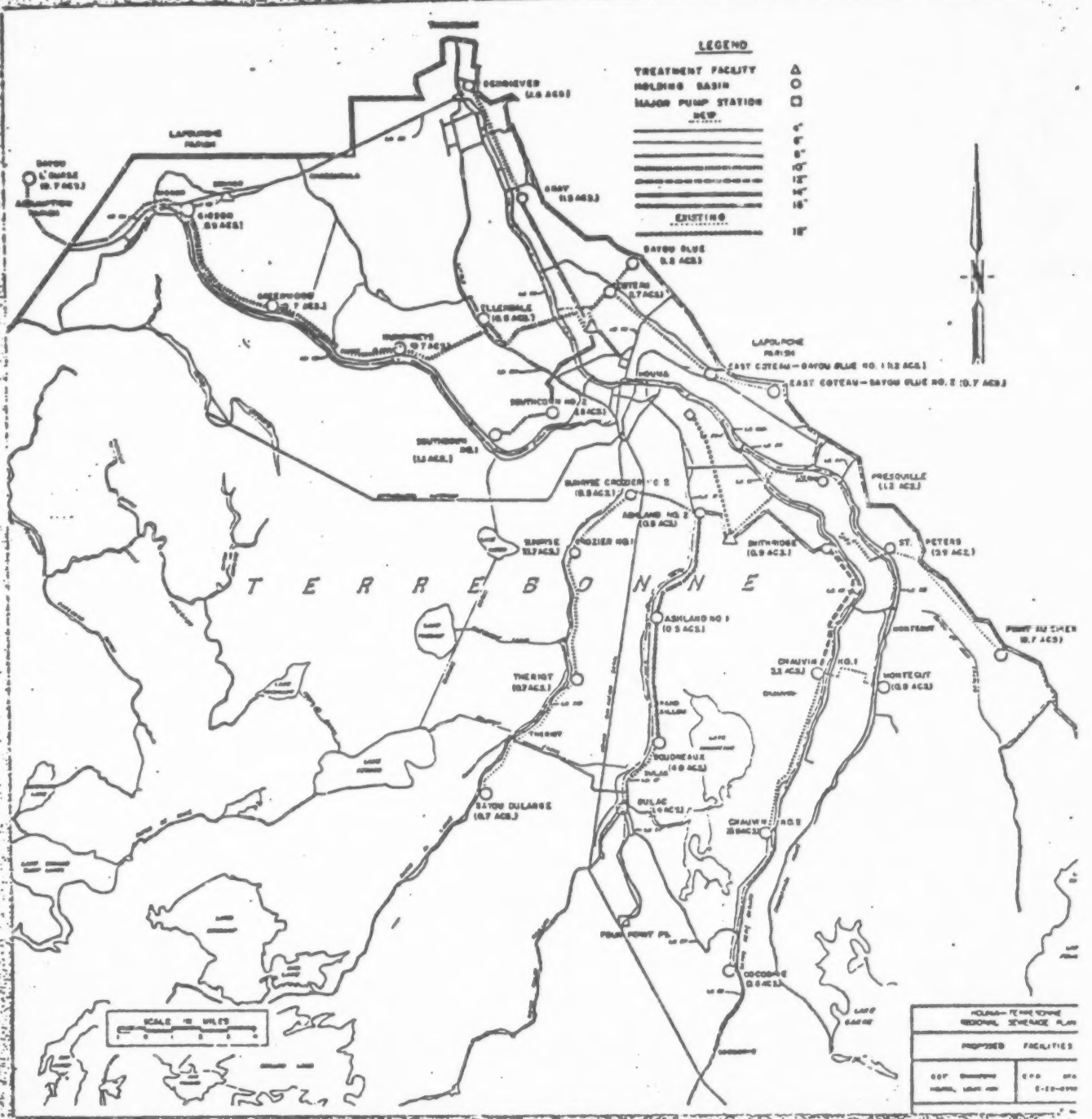
c. Assessment of accumulative effects in relationship to other planned projects in Terrebonne Parish.

d. Mitigation measures to lessen adverse effects.

4. Estimated Project Costs:

Federal Share	$59,600,000
State Share	-0-
Local Share	$19,900,000

Item 2 - Continued



Item 2 - Continued

Houma-Terrebonne Regional Planning Commission

P.O. BOX 1446 403 LIBERTY STREET
HOUMA, LOUISIANA 70361

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DONALD LYTLE

December 16, 1977

Mr. Joe Leindecker
Sverdrup, Parcel & Associates
800 North 12th Street
St. Louis, Missouri 63101

Re: SEWERAGE FACILITY PLAN - HOUMA/TERREBONNE PARISH

Dear Mr. Leindecker,

Upon request by the Terrebonne Parish Police Jury and the Department of Public Works, I would like to briefly discuss the future outlook and plans of the Parish as they relate to the Sewerage Facility Plans.

As you may know, Houma/Terrebonne is emerging as the Oil Center of Southeast Louisiana. With a national policy to push for oil exploration, this Parish has literally exploded in new residential and commercial/industrial growth; consequently, the Parish has not been able to keep up with the tremendous growth in providing municipal services such as sewerage.

Approximately eight (8) years ago, the Houma-Terrebonne Regional Planning Commission realized that if urban growth was to continue, adequate sewerage facilities would have to be provided. Through their encouragement, the City and Parish joined forces to provide this important service to the community. Time and time again, the Commission has gone on record as supporting this issue, and we urge you to look favorable on this project. These plans were based on planning studies completed by the Commission, ane we are in complete accord with the proposals.

The purpose behing Environmental Impact Studies is for the protection of the environment. Nothing is more damaging to the environment than raw sewerage in open-ditches, bayous and in people's yards. The only solution is Parish Wide Sewerage as presented in the Sewerage Facility-Plan.

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6. Sierra Club - Delta Chapter Comments on the Negative Declaration
7. Ecology Center of Louisiana, Inc. Comments on the Negative Declaration

Houma-Terrebonne Regional Planning Commission

P.O. BOX 1446 403 LIBERTY STREET
HOUMA, LOUISIANA 70361

CHUCK WEAVER
CHAIRMAN
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H. L. PERTUIT
TREASURER

RONALD J. SHAW
MERKLE B. KORNEGAY, JR
SYBIL P. MARTINEZ
KEITH P. AUTHEMENT
JULIUS P. HEBERT
DONALD LYTLE

If I can be of further assistence in your determination of the environmental effects of the sewerage plan, please do not hesitate to call.

I remain,

Very truly yours,

MARTIN BRUNO, JR.
Executive Director, Houma-Terrebonne
Regional Planning Commission
Director of Planning & Zoning,
City of Houma

MBjr:kim

cc: Mr. John Swilly
Department of Public Works
Mr. Fred A. Lemoine, Sec.-Treas.
Terrebonne Parish Police Jury

PLANNING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FIRST INTERNATIONAL BUILDING
1201 ELM STREET
DALLAS, TEXAS 75270

February 25, 1977

TO ALL INTERESTED AGENCIES AND PUBLIC GROUPS

As required by Federal Register Guidelines (April 14, 1975) for the preparation of Environmental Impact Statements (EIS's), an environmental review has been performed on the proposed EPA action below:

1. Houma-Terrebonne Regional Sewerage Plan
   Houma, Terrebonne Parish, Louisiana

2. C-22-0356-01-0

3. Estimated EPA Share: $26,900,000.00
   Estimated State Share: $ -0-
   Estimated Local Share: $10,900,000.00

The proposed project is for a regional sewerage system for Terrebonne Parish. The selected wastewater management plan consists of two (2) plants. Both new plants involve the use of existing facilities. The North Plant will be a 16.0 mgd activated biological filtration unit, located about two (2) miles northwest of downtown Houma. The South Plant will be a 13.0 mgd aerated pond system, located approximately six (6) miles southeast of Houma. Both plants will discharge into St. Louis Canal. A total of 678,203 feet of force main work would be required, ranging in size from 4-inch to 16-inch in diameter. (See enclosed map.)

Terrebonne Parish is unique in that the entire rural population is located on elevated portions of natural bayous which extend out in all directions from Houma. Each populated area will be served by its own gravity collection system connected to major pumping facilities by interconnecting force mains.

Approximately 217 miles of collection lines will be laid by digging a trench four (4) feet wide and seven (7) feet deep with a tractor and backhoe. Once the pipe has been placed in the ditch and joints connected, the trench will be backfilled and leveled.

Approximately 167.94 acres will be temporarily affected by construction activities and 5.03 acres will be permanently affected by the pump station installation. Trenches will be backfilled and the 167.94 acres will be allowed to revegetate to their original state.

All collection lines will be placed along highway, road or waterway levee rights-of-way. No collection lines will be constructed in any wetland area. This will be a grant condition of the proposed project.

The areawide sewer plan of the South Central Regional Planning and Development Commission is designed to provide wastewater collection and disposal for the populated areas where alternative types of sewage disposal cannot function properly and where existing facilities pose a health threat to inhabitants or pollution threats to the environment.

The land in Terrebonne Parish slopes generally and gently southward with a maximum elevation of about ten (10) feet above mean sea level and a minimum at one and one-half (1.5) feet above mean sea level. Maximum elevations occur in the northwest section of the Parish, and along the natural levee ridges of the bayous.

The State Archaeologist has requested an on-the-ground survey and further testing. This will be completed and approved by the State Archaeologist before construction begins. Mitigative measures, if necessary, will occur. This will be performed as part of the Step II work, and will be a grant condition of this project.

The Southdown Plantation House is currently listed on the National Register of Historic Places and is located within the project area. Any proposed project work will occur at least a half of a mile away from the Southdown Plantation House, but a survey will be conducted prior to construction. Should this survey identify cultural resources eligible for inclusion to the National Register of Historic Places, the Advisory Council of Historic Preservation will be afforded an opportunity to comment in accordance to its procedures, as appropriate, prior to taking any action which would affect the resources. This will be a grant condition of this project.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FIRST INTERNATIONAL BUILDING
1201 ELM STREET
DALLAS, TEXAS 75270

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1201 ELM STREET
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Item 4: Original Negative Declaration, February 25, 1977

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Landscaping techniques will be employed in an attempt to match the immediate area around the pump station to that of the surrounding area.

Any odor problems should be short in duration because of an efficient maintenance program supported by a telemetric monitoring system.

All machinery to be used in construction activities will be equipped with noise-suppressing devices. Dust problems if any occur, will be controlled. No blasting will be required for the proposed project. Holding pond levees and yard areas around the facilities will be seeded with grass so as to be aesthetically pleasing.

Water quality for the entire hydrologic area will generally improve, since several untreated point sources of discharge will be treated by the proposed facilities. The effluent from the two (2) plants will conform to areawide water quality standards.

The North Plant will be protected from flooding by the proposed parish-wide forced drainage project. The South Plant includes flood protection according to Federal Flood Insurance requirements. Flood protection for the pump stations and the collection lines has been designed according to Federal Flood Insurance requirements. The proposed project will not have any effect on the movement of floodwaters.

The anticipated land use and socioeconomic activities related to the proposed action conform with the existing land use plans as developed by the South Central Planning and Development Commission, the Houma-Terrebonne Regional Planning Commission, the Terrebonne Parish Police Jury and the Houma City Council.

Each area's share or the percent of its economic area population for the years 1940, 1950, 1960, and 1970 were researched and recorded. Both the years and the shares were transformed by taking the natural logarithm of the values. Straight line interpolations between the 1970 actual value and the 2020 projected value were used to obtain projected values for the years 1980, 1990, 2000, and 2010. Aerial photographs taken especially for this project were used in doing this. For ease in computing future flows per area, commercial and industrial development was converted into equivalent population. The total present population of the project area is 91,343, but by the design year of 1996 the population should attain 143,375. As in surrounding areas, industrial development in the Parish is increasing.

In attempting to regionalize the sewage treatment facilities for Terrebonne Parish, it was necessary to assess the existing facilities in terms of possible rehabilitation, upgrading, or possible expansion. Several alternative plans were proposed, with the number of plants ranging from one (1) to six (6). The main reasons for choosing the

proposed plan were based on economics, efficient use of the existing facilities and the effect of two (2) point sources of discharge, instead of several, upon the environment. The no action alternative was not chosen because if the project is not implemented, the major adverse impact on the environment would be on the wetlands environment, which comprises nearly 80 percent of Terrebonne Parish. The rapidly deteriorating water quality, caused by hundreds of point sources of discharge and untreated wastewaters would eventually cause the decline of the valuable aquatic resources of the Parish.

The review process indicated that significant environmental impacts would not result from the proposed action or that significant adverse impacts have been eliminated by making changes in the project. Consequently, a preliminary decision not to prepare an EIS has been made.

This action is taken on the basis of a careful review of the engineering report, environmental impact assessment, and other supporting data, which are on file in the above office with the environmental impact appraisal and are available for public scrutiny upon request. Copies of the environmental impact appraisal will be sent at cost on your request.

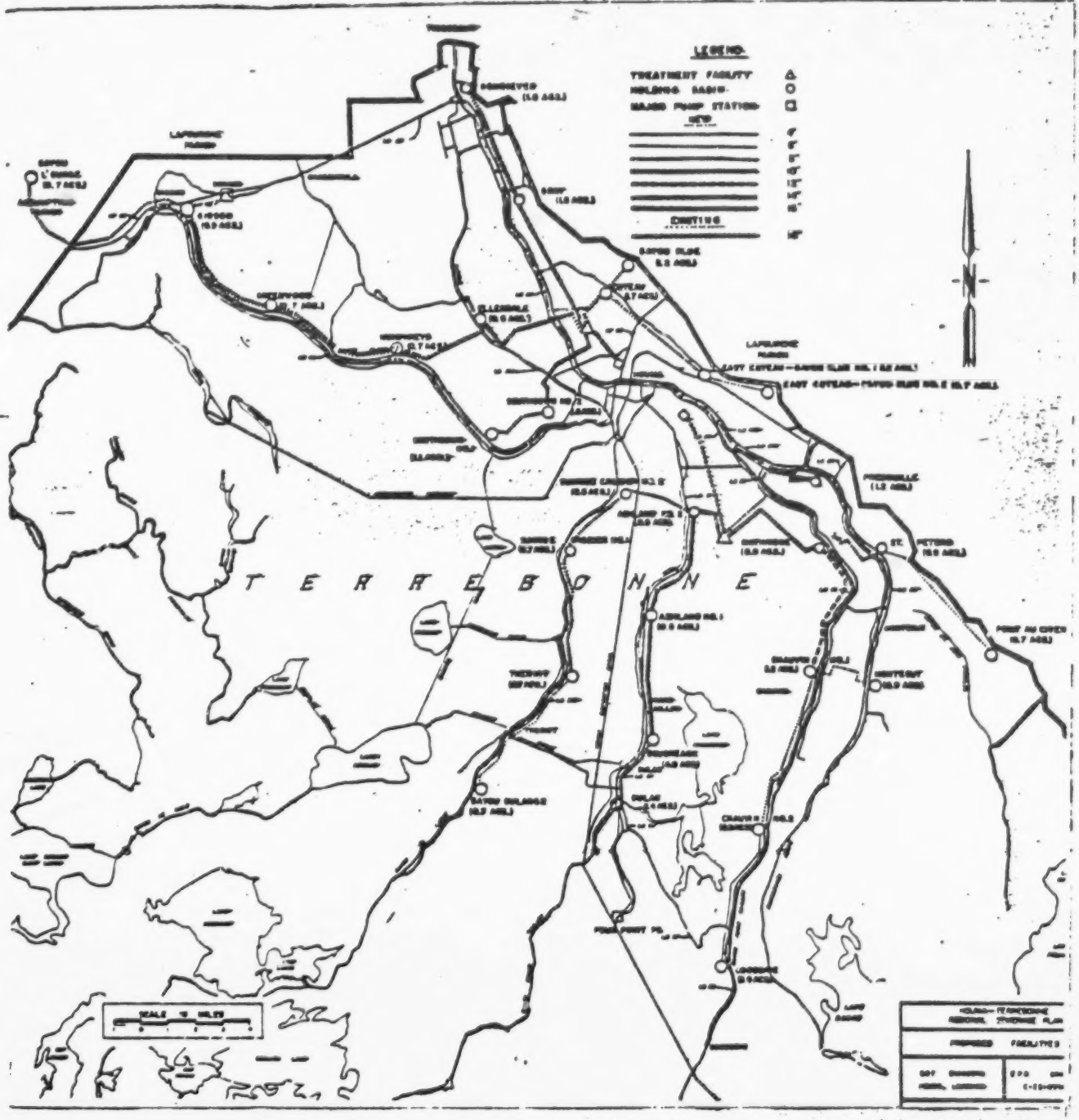
Comments supporting or disagreeing with this decision may be submitted for consideration by EPA. After evaluating the comments received, the Agency will make a final decision; however, no administrative action will be taken on the project for at least fifteen (15) working days after release of this negative declaration.

Sincerely yours,

John C. White

John C. White
Regional Administrator

Enclosure



Item 4 -- Continued

National Wildlife Federation

1412 16TH ST., N.W., WASHINGTON, D.C. 20036

Phone: 202—797-68

MAR 14 1977
EPA REGION VI
Office Regional Administrator

March 10, 1977

Mr. John White
Regional Administrator
EPA, Region VI
First International Building
1201 Elm Street
Dallas, Texas 75270

RE: Houma-Terrebonne Regional Sewerage Plan (C-22-0356-01-0)

Dear Mr. White:

We are in receipt of the Negative Declaration issued for the above-referenced project. I have today requested further information, including the environmental impact appraisal, from your staff supporting your decision not to issue an environmental impact statement (EIS) for this project.

Our initial reaction from reading the Negative Declaration is that an EIS should have been required. Accordingly, we hereby request that Step II approval not be given until we have had opportunity to review the potential impacts of this project and comment further on your decision not to issue an EIS.

We look forward to your speedy response to this request. Thank you.

Sincerely,

Tom Bick

Thomas K. Bick
201 Project
Resources Defense

TKB:kmb

cc: William Fontenot
Executive Director
Louisiana Wildlife Federation, Inc.
Post Office Box 16089, LSU
Baton Rouge, Louisiana 70893

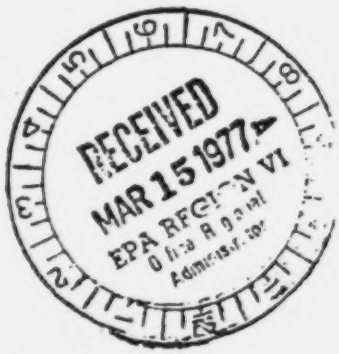
RECEIVED
MAR 17 1977
6AWP

RECEIVED
MAR 17 1977
EPA 6AW
REGION VI

Item 5: National Wildlife Federation Comments on the Negative Declaration

SIERRA CLUB, DELTA CHAPTER

New Orleans Group
111 S. Hennessey St.
New Orleans, La. 70119



RECEIVED
MAR 21 1977
6AWP

John C. White, Regional Administrator
Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. White,

The New Orleans Group of the Sierra Club has obtained your declaration that the EPA does not intend to prepare an Environmental Impact Statement for the Houma-Terrebonne Regional Sewerage Plan. We feel that an EIS is needed, and we request that you reverse your decision and order such a plan prepared.

Development is encouraged in an area served by sewer lines, especially if the lines are larger than necessary to support the current population. Projections should not be simple linear or geometric ones, but should consider the environmental setting of the area and should consider the possibility for growth in terms of resources available. The economy of the project area is heavily dependent on the oil fields, and these fields will very possibly become depleted within the next two or three decades. Houma is situated in a wetlands area, highly unsuited for development except along the rather narrow natural levee ridges. These factors should be considered in a full environmental review and the conclusions embodied in an EIS.

You state that the North Plant will be protected from flooding by a proposed drainage project. If the proposed project is rejected or modified it would appear that environmental disaster might be among the avoidable consequences of a flood.

Further, it appears in your map that some of the sewer lines planned for the southern portion of the project will be in areas of high or very high subsidence potential, as indicated by maps published by the State Planning Office. Installation of sewer lines followed by subsidence of the soil gives rise to multiple breaks in the lines, as we know all too well in New Orleans. This results in continuous release of raw sewage. This substitution of a non-point source for a point source would leave some of the area's wetlands seriously polluted. Most vulnerable to this would be the line in the Cocodrie area and the

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MAR 18 1977

EPA 6AW

Item 6: Sierra Club - Delta Chapter Comments on the Negative Declaration

line shown between Dulac and Cocodrie. A full EIS should be required to assess this potentially severe environmental impact.

For these reasons the New Orleans Group of the Sierra Club feels that an EIS is required by the National Environmental Policy Act, and that the decision expressed in your letter of February 25 should be reversed. Please notify us of any decision you make in this matter.

Sincerely yours,

Daniel Kessinger

Daniel Kessinger
Conservation Chairperson
New Orleans Group, Sierra Club

SIERRA CLUB, DELTA CHAPTER

261 Jules, Apt. 38
Jefferson, La. 70121
March 12, 1977

John C. White
Environmental Protection Agency
First International Building
Dallas, Texas 75270

Dear Mr. White,

I enclose a copy of a resolution passed today by the executive committee of the Delta Chapter of the Sierra Club. Please let me know what your decision in the matter is.

Basically I feel this is a good project, but it appears to need some further study.

Best wishes,

John P Sevenair

John P. Sevenair
Conservation Committee
Delta Chapter, Sierra Club

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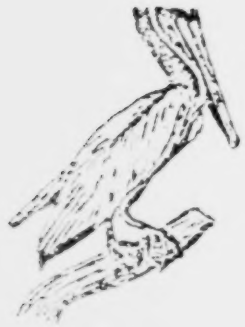
MAR 23 1977
6AWP



SIERRA CLUB, DELTA CHAPTER

Whereas the Environmental Protection Agency has made a preliminary determination that the Houma-Terrebonne Regional Sewerage Plan does not require an Environmental Impact Statement, and

Whereas this project has the potential for encouraging secondary development, the effects of which have not been assessed, and

Whereas this project calls for the construction of sewer lines in areas subject to very high potential soil subsidence, especially between Dulac and Cocodrie, and such subsidence causes breaks in sewer lines and results in the pollution that sewer systems are supposed to prevent,

THEREFORE BE IT RESOLVED that the Delta Chapter of the Sierra Club requests that the Regional Administrator reverse his previous decision, and order the preparation of an EIS in accordance with the requirements of the National Environmental Policy Act.

ECOLOGY CENTER OF LOUISIANA, INC.

March 11, 1977

Mr. John C. White
Regional Administrator
U.S. Environmental Protection Agency
First International Building
1201 Elm Street
Dallas, Texas 75270

RECEIVED
MAR 21 1977
6AWP

Dear John:

We received this morning for the first time a copy of your notice of February 25th concerning the Houma-Terrebonne Regional Sewerage Plan. I am inclined to believe that you erred in your preliminary decision not to prepare an EIS. Unless the facilities proposed are designed to serve only existing development in Terrebonne Parish, it is inconceivable to me that 128 miles of new forced mains up to 16 inches in diameter will not lead to secondary development having a significant impact on the environment.

It is not possible to tell from the information contained in your notice whether or not we would object to the project itself. We would have to review substantial additional information on the impacts of proposed secondary development and specific plans for the protection of endangered species (photographs sound insufficient) and important archeological sites.

I understand from our phone conversation that the time required for preparation of an EIS might jeopardize funding for the project under current appropriations. That is regrettable, but does not justify failure to provide for full public review of the proposal prior to a final decision to proceed. (I might point out that such problems might be avoided if EPA would require the State of Louisiana to comply with the public participation provisions of PL 92-500.)

Please keep me advised of developments with respect to this project.

Sincerely,

J. Ross Vincent
President

RECEIVED
MAR 1[illegible] 1977
EPA 6AW
REGION VI

165

Item 7: Ecology Center of Louisiana, Inc. Comments on the Negative Declaration

P.O. Box 19344, New Orleans, Louisiana 70179, (504) 482-8760